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ABSTRACT

This report describes a program for improving homework on-time completion with high school Fundamental Algebra students in an urban gifted and arts magnet high school. The Grade Control Chart was selected as a strategy for presenting students with a visual reminder of the value of timely completion of homework. The skills needed to produce this chart are in keeping with the National Council of Teachers of Mathematics (NCTM) Standards that call for the incorporation of statistical representations, self-analysis, goal setting, problem solving, and journal writing throughout the mathematics curriculum. The experiment produced negative effect sizes, indicating no practical significance to the intervention, but some slowing of the decline in homework was noted toward the end of the experiment period. Student response to the intervention was mixed, though generally positive. Appendices include: a homework record/seating chart, baseline data on rate of homework completion, teacher homework survey form, student and parent homework survey forms, and the Grade Control Chart. (Contains 76 references.) (Author/MKR)

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SOLVING THE HOMEWORK PROBLEM IN ALGEBRA THROUGH THE USE OF GRADE CONTROL CHARTING

by

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Submitted in partial fulfillment of the requirements for
the degree of Master's of Arts in Education

Saint Xavier University - IRI
Field-Based Master's Program

Action Research Final Report
Site: Rockford I
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ABSTRACT

AUTHOR: CAROL J. BEAMAN SITE: ROCKFORD 1

DATE: April 1994

TITLE: Solving the Homework Problem In Algebra Through the Use of Grade Control Charting.

ABSTRACT: This report describes a program for improving homework on-time completion with high school Fundamental Algebra students in an urban gifted and arts magnet high school in a medium sized mid-western city located only a few hours from a major metropolitan center. The district and curriculum are undergoing great changes as a result of a desegregation lawsuit. The staff will change greatly this year and next because of a state wide early retirement program. The problem was originally noted by the teaching staff and documented by classroom records.

Analysis of the probable cause data combined with teacher observations indicated that students' expressed interest in passing Fundamental Algebra classes did not translate into an understanding of the value complete and on-time homework has in achieving that goal.

Solution strategies suggested by the literature combined with an analysis of the problem setting, resulted in the selection of the Grade Control Chart as a strategy for visually presenting students with the value of homework's timely completion. The skills needed in producing this Chart are in keeping with the NCTM (National Council of Teachers of Mathematics) standards that call for the incorporation of statistical representations, self-analysis, goal setting, problem solving and journal writing throughout the mathematics curriculum. The Grade Control Chart is similar to Statistical Process Control Charts used in quality control.

The experiment produced negative effect size results indicating no practical significance to the intervention. Some slowing of the decline in homework was noted toward the end of the experiment period. It is suggested that a longer period of intervention be tried to see if this slowing trend continues. Student response to the intervention was mixed though generally positive.

Chapter 1

PROBLEM STATEMENT AND COMMUNITY BACKGROUND

General Statement of the Problem:

Many of the students in the Fundamental Algebra 3-4 classes fail to do their homework. This is evidenced by teacher observations on seating charts, grade-book notations, lack of attention when answers are being read, parental inquiries concerning lack of homework and the students' own comments. Students fail to see any connection between homework and overall class performance.

Immediate Problem Context

The high school class involved in this action research was one of five Fundamental Algebra 3-4 classes conducted each year. Fundamental Algebra 3-4 is a continuation of Fundamental Algebra 1-2. Together the two classes cover in two years time the content of a regular one year algebra

course. The students enrolled in the three-four class have survived one year of algebra and are now trying to complete enough algebra content to satisfy one of the years required by most colleges.

Traditionally, these students are not mathematically inclined, but they are survivors with a desire, either on their part or the part of their parents, to keep the door open to college by at least completing the algebra requirements. Many of the students have not developed good work or study habits.

Class sizes run high throughout the mathematics department, with the average being 27 students in a class. It is common to start the year above the contract limit of 33 students. Classes meet for 50 minutes each day. Teachers are assigned five classes with an upper limit of 150 students. With such numbers involved it is difficult to grade every homework paper individually.

The school has an overall population of 1,697, including 63.1 percent White, 31.8 percent African-American, 2.6 percent Hispanic, 2.2 percent Asian/Pacific Islander, and 0.4 percent Native American (see Figure 1). Low income families comprise 12.9 percent of the student home environment. Limited-English-Proficient students make up 0.7 percent of the school's population. The school's dropout rate during the 1992-93 school year was 4.9 percent. In addition the school experienced an 18.4 percent chronic truancy rate (students absent from school more than ten percent of the time without valid cause) during the 1992-93 school year (Auburn High School, 1993).

Most of the students are bussed to the school. They come from every neighborhood in the community. For the past fifteen years the school has functioned as a magnet school, housing two special programs in addition to the regular program. The two special programs include a centralized gifted program and a program for the creative and performing arts. The

Fundamental Algebra classes draw heavily from the students in this latter group. Many of the students are very involved in after school rehearsals and performances.

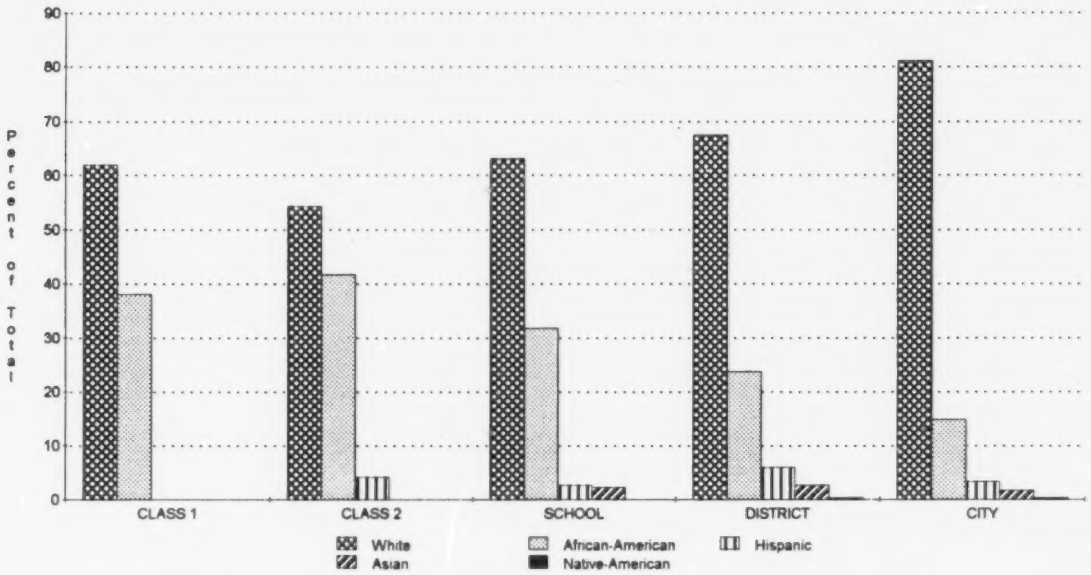


Figure 1

Comparison of Ethnic Backgrounds

For Classes, School, District and City

The school's administration consists of a principal and three assistant principals. The principal is the first woman hired to such a position in this school district. Two of the vice principals spend their time dealing primarily with discipline. The third assistant principal is assigned the duties of meeting the court ordered "excellence in equity" guidelines.

The school district has been acting under an interim court order for desegregation. An outside master has been assigned to the district to oversee that order's implementation. The court order will cause the number of

students in all algebra classes to increase within the next year. As a result of the order, all lower level math classes have been eliminated. This, with a graduation requirement for two years of mathematics, will bring more weak or non-mathematically inclined students into the algebra sequence. To soften the blow, a mentoring/tutoring program and double scheduling with an Algebridge Lab (College Entrance Examination Board and Testing Service, 1990) have already been added to the school's curriculum.

There are currently 13 full time teachers in the math department. A full time English/math tutor coordinator and numerous community volunteers participate in the mentoring/tutoring program. Course offerings include Pre-Algebra through Advanced Placement Calculus. It should be noted that this is the last year for Pre-Algebra. After this year all incoming students will have to complete a minimum of Fundamental Algebra 3-4 in order to graduate. Already, this year, there are students in the Fundamental Algebra 3-4 classes who would have, in other years, opted for a Consumer Math course rather than stay in the algebra sequence. That option is now closed to them.

Surrounding Community

The community this high school is located in is a medium size mid-western city less than two hours from a major metropolitan city. It's school district, a unit district, is one of the largest geographically in the state. The community's manufacturing base consists of aero-space, fastener, pharmaceutical, tool and die industries and many job shops. The 1990

median household effective buying income was $28,891. This can be compared to $27,912 at the national level and $31,119 at the state level (Rockford Area Council of 100, 1992).

There are four public high schools, four middle schools, and 39 elementary schools in the district. According to the district's figures, these schools served 28,045 students pre-kindergarten-12, during the 1992-93 school year. There are another seven private high schools and 23 private elementary schools serving the community in which the district is located. These private schools served another 6,220 students in 1992-93 (Trapp, 1992). Preliminary figures indicate a drop in enrollment of over 500 students for the 1993-94 school year. This drop comes at a time when the district had anticipated an increase of 400 students. Many of these students have apparently transferred to private schools where enrollments are up about 500 students (Rockford Register Star, 1993).

The public school student population is 67.4 percent white, 23.7 percent African-American, 6.0 percent Hispanic, 2.6 percent Asian/Pacific Islander, and 0.3 percent Native American (see Figure 1). There are 3.2 percent of the student population being serviced by special education programs (Trapp, 1993).

Elementary schools service kindergarten through sixth grade children. Some schools are paired so one building houses K-3 and its partner houses fourth-sixth grades. A true middle school concept has been implemented in each of the four middle schools. Teams of core teachers work with seventh and eighth grade students using the school within a school concept.

Family socio-economic status covers a wide range. The district draws 30.5 percent of its student population from low income backgrounds. This

lower end is represented by a mixture of all ethnic groups. District wide, 2.8 percent of the students are limited English-Proficient (Trapp, 1992).

The city provides support services for a very large agricultural community specializing in corn, soybean, dairy, hog and some cattle production. Few of the district's students come from this rural environment. Most of the farm residents attend school in the smaller surrounding towns.

Most of the students in the district come from an urban area with a population of 139,426. The racial makeup of the city is 81.1 percent white, 14.8 percent African-American, 0.3 percent Native American, 1.7 percent Asian, and 3.3 percent Hispanic (See figure 1). The white population is represented by a large German, Irish, Swedish, and Italian community. Languages spoken in the community include English, German, Yiddish, Greek, Indian, Italian, French or French Creole, Spanish, Polish, Korean, Vietnamese, and Laotian (United States Census, 1990).

In 1989, under continuing economic pressures, the district closed seven elementary schools, two middle schools and a high school. This led to a class action suit claiming repeated deliberate discrimination against minority students in particular and west side residents in general. The suit was still in litigation in mid October 1993, with the district under an interim order to modify its operations to correct for assumed past violations.

Gang activity has been a recurring problem in all of the public schools in the district. The school in this study has a large contingent of gang members. While there have been few recent incidents involving the gangs on school property, there is still that pervading aura of influence from outside. During the spring of 1993 a student was injured in a drive by shooting incident on the school's parking lot during the lunch hour. Rumors of gang trouble have caused some night football games to be rescheduled for daylight

hours in order to increase security. Some students admit that their friends do not view school work or achievement as "cool".

Regional and National Contexts of Problem

When a group of high school or middle school teachers gather, one of the first topics discussed is ways to convince students that they need to do their homework. The issue of homework is one that runs to both extremes. Currently there is a renewed push by some groups to increase the amount of homework assigned to students. This is particularly true within groups seeking improved minority educational performance. These groups cite research that indicates that teaching time should not be wasted on in-class homework (LaConte, 1981) (Doyle & Barber, 1990).

For the third time this century homework has again come to be valued. During the late 1940's and early 1950's homework fell out of favor with those who were writing about education. Cooper (1989) reports that "H.J.Otto wrote, 'compulsory homework does not result in sufficiently improved academic accomplishments to justify retention' (Otto 1950, p.380)". But with the advent of the space age in the late 1950's, homework became a cure for what ailed the United States educational institutions. It was thought more homework made better, faster learning possible (Cooper, 1989). By the late sixties, according to Cooper (1989), R. P. Wildman had made homework a bad word again, saying that it interfered with social experiences and other basic needs. With the publication of a Nation at Risk (NCEE, 1983)

homework was again seen as a cure for educational short comings (Cooper, 1989).

Though homework is currently back in favor with the educational community, students will probably never find favor with it. Just because homework is assigned, does not mean that it is completed or for that matter attempted. The homework problem is a complex one involving motivation, cultural influences, time management and the perception of value.

A study conducted by Stiles in 1988 at an International School in Bangkok, Thailand, showed that American students "lagged behind Asian students by 22 percent and behind the Europeans by 45 percent in time spent doing homework" (Stiles, 1992, p. 62). Stiles had conducted his study at an international school that was based on American techniques with the hope that he would be able to separate cultural background from school practices as a variable in achievement discrepancies (Stiles, 1992).

An ERIC search in January 1993, identified 1717 articles concerning homework. This would indicate that homework is a real subject of concern. While many of these articles referred to various theories about the effectiveness of homework, just as many contained ideas for motivating students to do their homework. Many others contain prescriptions for changing homework assignments to make them more meaningful.

Chapter 2

PROBLEM EVIDENCE AND PROBABLE CAUSE FOR FUNDAMENTAL ALGEBRA 3-4 STUDENTS FAILING TO COMPLETE THEIR HOMEWORK ASSIGNMENTS

Problem Background

Many Fundamental Algebra 3-4 students in the setting described fail to complete homework assignments on a regular basis. This is evidenced by teacher observations on seating charts, gradebook notation, lack of attention when answers are being read, parental inquiries concerning lack of homework and the students' own comments (see Appendix A).

Evidence the Problem Exists

The teacher/researcher's records for the period from August 31 to October 1, 1993, indicate that students in the first hour control group attempted their homework on a average of 72.835 percent of the time. Those in the second hour experimental group attempted their homework at a slightly lower rate of 65.52 percent of the time (see Appendix B). A key word here is

attempted. This problem is not limited to the classroom involved in this study.

In early November, 1993, a survey (see Appendix C) was sent to all 49 high school math teachers within the district. Forty-two of the surveys were returned. Eighty-six percent of the respondents believed homework completion to be very important to their students' success in their math classes, rating homework a five, on the scale of one to five, with five being very important. Approximately 93 percent of the respondents said that they assigned homework at least four times a week. These same teachers estimated that approximately 78 percent (based on a weighted average) of their students attempt their homework regularly.

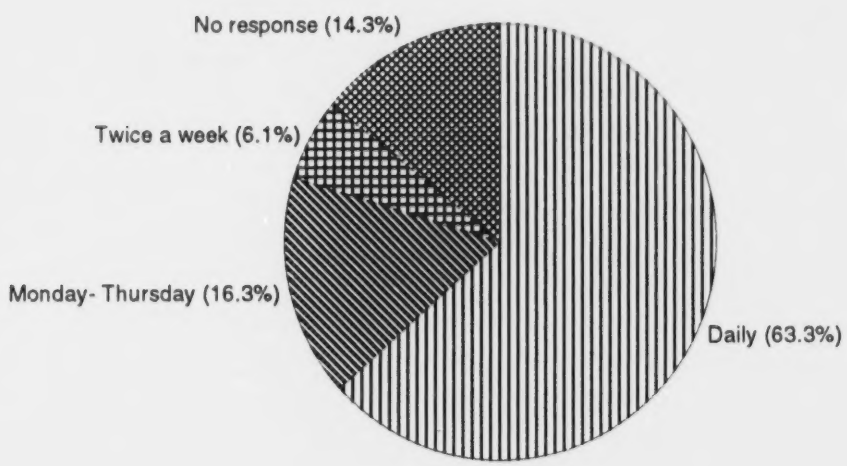


Figure 2
Frequency With Which District's High School Math Teachers Assign Homework

Based on conversations overheard in the school's faculty lounge, math is not the only subject where students exhibit a low rate of return on homework. With district wide curriculum changes bringing students with wider ranges of skills into some of the previously higher level electives, more teachers are experiencing a problem with homework completion. Foreign language teachers, who previously dealt mainly with college bound students, are expressing the same frustration that required course teachers have expressed in the past about homework completion rates.

As further evidence that completed homework is a concern throughout the entire building where this action research is to be implemented, last year the school instituted a homework hotline program. Unfortunately the system, advertised as a homework hotline, functions more as a voice mail system.

Probable Cause

A search of the ERIC (Educational Resources Information Center) system yielded over 1700 documents and articles concerning homework. Many of these references related to math homework specifically. A great many references debated the question of what part homework plays in student achievement (Paschal, Weinstein & Walberg, 1984) (Foyle & Bailey, 1986) (Turvey, 1986) (Chen & Stevenson, 1989) (Cooper, 1989) (Foyle & Lyman, 1989) (Easton, 1990) (Earle, 1992). Still other references detailed some of the reasons students did not complete their homework (Fehrmann, Keith & Reimers, 1987).

Most of the studies in the literature are opinion based and few represent real experimental studies. Those that are actual studies of the validity of homework as a tool for increasing achievement can be divided almost evenly between homework is good and homework is bad or at best neutral (Featherstone, 1985) (Cooper, 1989). Barber contends that "...even where achievement gains *have* been found, they have been minimal, especially in comparison to the amount of work expended by teachers and students" (Barber, 1986, p.55).

At the same time, other reviews of the literature suggest that the positive effects of homework are especially strong among high school students (Cooper, 1989) (Foyle et al., 1989) (Rutherford, 1989) (Doyle et al., 1990). Indeed, lower ability high school math students attain performance levels equal to or better than higher ability students when they complete more homework (Keith, 1982) (Turvey, 1986) (Doyle et al., 1990) (Easton, 1990). Perseverance with homework seems also to level the effects of low economic status on achievement (Doyle et al., 1990). Earle (1992, p.39) says that "Pressman (1989) found that homework constitutes a significant portion of a student's total 'opportunity to learn'". Because good homework extends the learning time, it should have a positive affect on learning (Turvey 1986).

Earle (1992) compares homework's purposes to six of Gagne's nine events of instruction, including:

1. "Stimulating recall of prerequisite learning" (p. 39) by serving as an advance organizer.
2. "Presenting stimulus material" (p. 39) through reading assignments too complex to do during class time.
3. Practice makes perfect, may not always be true, but certainly learning takes time, is true (Foyle et al., 1986). Homework

provides the time for practice to be internalized and thus enhances learning.

4. Homework correcting does not put feedback and assessment off until the big test. It allows for mid course correction so the student does not continue to practice incorrectly.
5. Some formal assessments are too lengthy to fit within a class period.
6. Transfer of learned material to problem solving events enhances retention and further transfer.

In light of the lack of agreement on homework's usefulness, this study will take the stand that consistent homework completion does have a significant affect on student achievement in Fundamental Algebra 3-4 classes, and is therefore a desirable behavior. Using that premise, homework completion requires increased motivation.

The literature suggests the following reasons for students not completing homework:

1. The teacher never collects it anyway (Braswell, 1985) (Foyle et al., 1986) (Turvey, 1986) (Palardy, 1988) (Parkhurst, 1989).
2. The student is unable to understand the assignment. Not enough explanation has been given in class (Turvey, 1986) (Foyle et al., 1989) (Parkhurst, 1989) (Rutherford, 1989) (Earle, 1992).
3. Parents do not place a high priority on homework (Baratta-Lorton, 1978) (Fehrmann et al., 1987) (Moskowitz, 1988) (Rutherford, 1989) (Bonstingl, 1992).
4. The teacher simply gives too much homework for anyone to complete (Palardy, 1988) (Chen et al., 1989) (Foyle et al., 1989) (Doyle et al., 1990) (McLean, 1993).

5. Students have jobs outside of school and have no time to do homework. Many report working late hours on school nights. These same students work anywhere from 20 to 40 hours per week (Cole, 1991) (Weiss, 1992).
6. Family activities, obligations and extracurricular activities do not allow enough time to complete the homework (Goldman, McQueen & Little,1984) (Featherstone, 1985) (Pendergrass, 1985) (Bergstrom, 1985) (Moskowitz, 1988) (Palardy, 1988) (Nottingham, 1988) (Parkhurst, 1989).
7. Students do not have good organizational skills and simply forget what it is they are supposed to do for homework. Their note taking skills are too poor to help them overcome this lack of organization (Foyle, 1986) (Foyle et al., 1986) (Swartz, 1986) (Horner, 1987) (Canter, 1988) (Moskowitz, 1988) (Parkhurst, 1989).
8. Students would rather watch television than do homework (See Figure 3). While the time spent watching television may actually improve some student achievement, especially among lower achieving students, it seems to have a negative affect on generally better students. Television seems to affect high school students less than younger students. Regardless of the results, time spent watching television is usually time lost for homework (Keith, Reimers, Fehrmann, Pottebaum & Aubey, 1986), (Partin, 1986) (Fehrmann, Keith & Reimers, 1987), (Doyle et al., 1990).
9. The student's home environment is not conducive to doing homework. There is no quiet place to accomplish homework

(Baratta-Lorton, 1978) (Goldman et al, 1984) (Singh, 1987) (Parkhurst, 1989).

10. The student has never needed to do homework before in order to get good grades. Now all of a sudden the work seems overwhelming because the required skills have not been sharpened over time (Herman, 1983) (Parkhurst, 1989) (Meeks, 1991). Many homework and learning gaps come from high truancy rates. Any excuse will do (Jackson, 1985), (Marquis, 1989).
11. The student sees no correlation between doing the homework and succeeding in the class even though homework might be counted toward the final grade. It is in fact easier not to succeed. The motivation to do homework is just not there (Keith,1982), (Jackson,1985), (Walberg, Paschal & Weinstein, 1985) (Johnson, 1989) (Marquis, 1989) (Parkhurst, 1989) (McLean, 1993).
12. Drug and alcohol use make it impossible for some students to concentrate long enough to complete homework (Dean, 1989).
13. Everybody gives homework the same night. There are not enough hours in the evening (Jongsma, 1985) (Bonfiglio, 1988) (Palardy, 1988) (Murphy & Decker, 1990).
14. Lack of goal definition causes students to respond only to today's immediate needs and interests (Goldman et al., 1984) (Glomb & West, 1990).
15. Many students exhibit an inability to take responsibility for their own actions. Included in that responsibility is the requirement to meet deadlines (Parkhurst, 1989) (Glomb et al., 1990).

16. Reading skills may not be sufficient to allow students to successfully complete certain types of homework assignments (Anderson, et al, 1986).

Probable Cause Within the Particular Setting Studied

In mid-October a survey was conducted among students in the Fundamental Algebra 3-4 classes. These two classes will be used as the experimental group and the control group for this study. As part of a statistics unit the students tallied the survey results and tried to come up with graphs to display the information. Some of the results were surprising even to the students. The variety of probable causes for failure to do homework was very enlightening. Table 1 gives student responses as to reasons for past failure to complete homework assignments on time. Interestingly, the student generated list of probable causes is quite varied. However, certain patterns may be apparent in studying Table 1. Certainly friends, tiredness and phone calls seem to play a big part in not getting homework done.

Table 1

Student Survey Responses to the Question,
"List a Few Things That Might Prevent
You From Doing Your Homework"

Responses	Times mentioned
Friends	15
Tiredness	15
Phone calls	10
Television	8
Illness	6
Not Understanding it (Work too hard)	6
Sports	6
Chores	5
Baby-sitting	4
Family Complications	4
Forgetfulness	4
Job	4
Church	3
Date with boyfriend or girlfriend	2
No Time	2
Other Homework	2
Radio or Stereo	2
Other Homework	2
Errands	1
Better things to do (Fun)	1
Dance Class	1
Nagging	1
Out to Dinner	1
Parties	1
Punishment	1

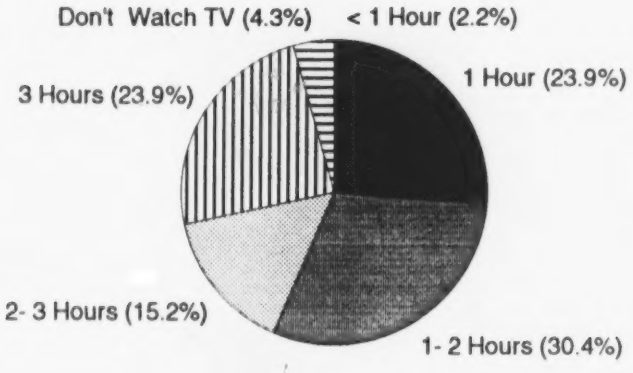


Figure 3

Student Survey Responses to the Question

How much television do you watch each night?

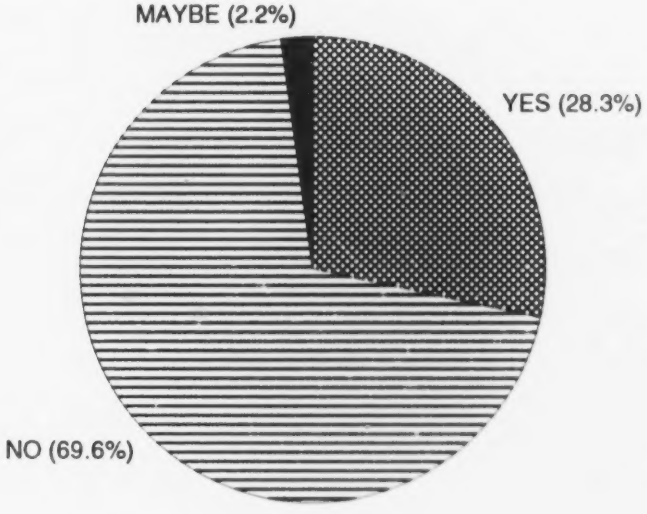


Figure 4

Percent of Students in the Fundamental Algebra 3-4 Classes

That Hold Down Jobs After School

The surprise was that not all that many students held down jobs. The more interesting discovery had to do with the number of hours these students put in on their out of school jobs. A majority of the employed students indicated that they worked between 20 and 30 hours, with some indicating that they worked more than 40 hours each week (see Figures 4 and 5).

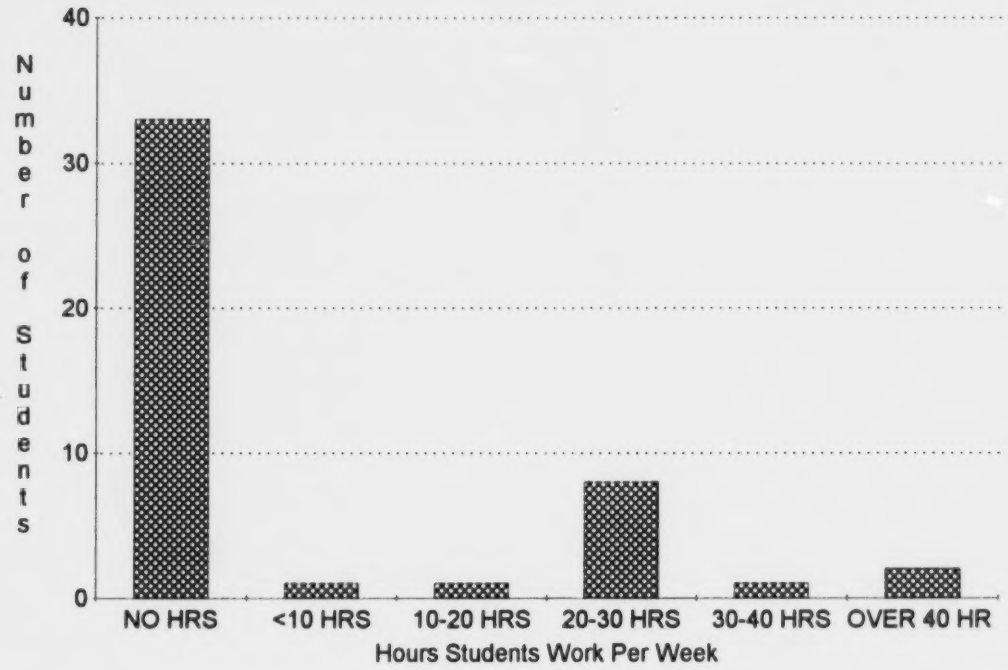


Figure 5

Job Hours Worked by Fundamental Algebra 3-4 Students Each Week

A survey conducted among parents of students enrolled in the two classes yielded yet another list of probable causes for lack of homework completion (see Table 2).

Table 2

Parent Survey Responses to the Question: "What things might interfere with your Student Completing His/Her Homework"?

RESPONSES	TIMES MENTIONED
Television	9
Phone	8
Job	5
Doesn't understand/Teacher's fault	4
Illness	4
Church	3
Family Obligations	3
Friends	2
Music	2
Scouts	2
Sports	2
Tiredness	2
Activities	1
Didn't bring book home	1
Emotional/physical stress	1
Lack of Mom hounding to get it done	1
Other homework	1
School programs	1
Shopping	1
Wanting to be outside	1

Some recurring themes seem to be that homework might not receive a student's full attention because of time spent with friends either physically or on the phone, because of tiredness or because of television viewing. Students and parents both responded with these four main distractions. Interestingly, jobs only entered into the picture for 13 of the 46 students involved in the study. Sports and lack of understanding were not as widely listed as might be expected. However, responses like no time, forgetfulness and tiredness might stem from extracurricular activities such as sports or performance rehearsals. It might be helpful to get further input into these local causes. The journal writing aspect of the intervention may shed more light on the causes of student failure to complete homework assignments on time (see Appendix D).

CHAPTER 3

THE SOLUTION STRATEGY AND LITERATURE REVIEW

A search of the ERIC system was conducted using the single descriptor HOMEWORK. An attempt was made to narrow this to homework in mathematics. However, it was decided early on that the general topic of homework, regardless of subject area, was relevant to this particular study.

Homework was described in the literature as being divided into four categories: practice and drill, preparation, creativity, or extension (Lee & Pruitt, 1979), (LaConte, 1981), (Herman, 1983), (Jongsma, 1985), (Foyle, 1986) (Palardy, 1988), (Rutherford, 1989). It was pointed out that most of what is assigned as homework in math is of the practice and drill variety with some preparation thrown in for good measure. The literature indicates that students will be more interested in doing homework if there is less drill and more variety.

What the Literature Suggests to Increase Homework Completion

The literature offered a number of ideas for increasing homework completion rates, with many centering on getting parents involved. Interestingly, Cooper cataloged no positive or negative effect of parental involvement on student homework (1989). Studies related to this were,

Cooper contended, too poorly defined to lead to any conclusions. In fact, Doyle and Barber (1990) suggest that differing parental skill levels might cause such parent involvement to have a negative effect.

Others suggestions like homework clubs, less homework, long term project related homework, assignment calendars, homework hotlines, pop quizzes, even referrals or calls home for non completion of homework were among the ideas put forth and at times refuted in the literature (Lieberman, 1983) (Canter, 1988) (Rutherford, 1988) (Loewer, 1989) (Marquis, 1989) Jongsma (1985). suggests student involvement in establishing homework policies and even selecting assignments. At minimum, a school wide, or perhaps a district wide, homework policy needs to be established and communicated to parents (Parkhurst, 1989).

One article suggested a homework row approach where students in a particular row, to be announced upon entering the class, were responsible for placing the previous night's homework on the board. Since student's could not be sure when their row would be picked, they always had to be prepared (Friedman, 1991). A similar suggestion by Nadler (1987) required students chosen at random to place homework problems on the board immediately upon entering the classroom. This procedure provides almost instant discussion problems. Once again the element of not knowing when your turn could come was the motivation for doing the homework.

One solution seemed to dominate much of the literature. That solution required that the teacher collect, grade and comment on every single homework assignment. This process not only seems to increase completion rate, but correlates well with advances in achievement (Pascal, Weinstein & Walberg, 1984) (Elawar & Corno, 1985) (Featherstone, 1985) (Foyle, 1986) (Lopez, Sullivan & Weber, 1988) (Palardy, 1988) (Foyle et al., 1989).

Random collection of four or five papers from each class each day was suggested in one article. In this method the homework component of the student's grade is determined by the ratio of submitted assignments to selected assignments (Artzt, 1987).

A process of grading two or three problems on each student's paper was also suggested as a way to overcome the concern that the teacher never collects or grades homework (Braswell, 1985) (Foyle et al., 1989) (Marquis, 1989). A variation on this involved student pairs grading each others papers against a teacher prepared key. This was used on selected problems as opposed to entire assignments. The selection process was not preannounced, requiring students to be prepared with the entire assignment. Peer graded papers were then submitted to the instructor (Mafi, 1989).

What Others Suggest to Increase Homework Completion

Some of the teachers in the school where this action research was applied, weight homework very high in determining the students' grades. One teacher, only recently retired, had the rule that students must complete 70 percent of their homework and needed only to pass one test to pass a quarter. Surprisingly, that teacher's failure rate was still high. Throughout the literature teachers were cited as counting homework as at least 20 percent of a final grade, regardless of the manner in which students were held accountable for it (Rutherford, 1989).

A current suggestion that is being given throughout the district calls for individualized assignments for students. Cooper (1989) gave this suggestion

a very low priority. It should be noted that Foyle and Lyman (1989) encouraged individualized homework (Palardy, 1988).

Responsibility sheets, weekly reports to parents concerning homework completion, have been tried in some schools with limited results. Those students who do not wish to do the homework still do not do it and parents and teachers soon tire of the process (Parkhurst, 1989).

Project Outcome

As a result of the intervention applied in the experimental classroom during the period from November 1993 through mid-January 1994, the students in the Fundamental Algebra 3-4 classes will come to value homework as an integral tool for improving their algebra success. This valuing will be evidenced by a 12 percent increase in on-time homework completion rate. This will be further evidenced by an improvement in student attitudes and responsibility concerning homework as measured by student and teacher journal entries (Petreshene, 1986).

Process Objectives

1. As a result of early exercises in journal writing, students will become comfortable with writing about assignments and learn to express mathematical ideas and concerns in written form.

2. As a result of discussions relating to goal planning and the relating of all problems to setting goals, students will come to question where they are going before setting off on an assignment. They will begin to set goals for

their process as well as their grades. They will learn to make mid-course corrections as needed.

3. As a result of teaching the units on statistical interpretation and coordinate graphing early in the year, students will develop the skills needed to plot their homework grades on the revised Grade Control Charts. They will begin to interpret the GCC's meaning to them personally.

4. As a result of the planning and implementation of a series of lessons related to the use of the GCC, the experimental group will understand the content and process of using this tool as part of the intervention.

5. As a result of this intervention, some students will come to see they have the locus of control for much of their progress or lack of progress in algebra achievement.

6. As a result of the experience with the Grade Control Chart, students will be exposed to the concept of SPC (Statistical Process Control) as it relates to quality control in the manufacturing world.

Proposal Solution Components

It seems that many of the solutions proposed in the literature do not address the matter of developing an intrinsic motivator for completing homework. An extrinsic motivator seems to be ever present (Foyle et al., 1989) (Keith & Benson, 1992). While extrinsic rewards probably cannot be avoided, it seems that the problem of homework completion would best be solved if students really understood that homework had a value beyond the immediate grade (Turvey, 1986) (Cooper, 1989) (Keith et al., 1992),

(McLean, 1993). Most seem to view it as something to get done rather than as a learning tool (Pendergrass, 1985). If somehow a correlation could be achieved between homework completion and success in the algebra course work, students might become their own best homework motivators.

Few students set out to deliberately fail algebra. But for many students their expressed interest in passing Fundamental Algebra does not translate into an understanding of the value complete and on-time homework has in achieving that goal (Glomb et al., 1990). They do not equate homework with the practice necessary to compete in the main event. Many do express an attitude of giving up without a fight.

Any solution to this problem must develop in the student a sense of success in the subject area as well as a sense of value in homework as a tool for attaining that success. The student must feel that he/she has some control over his accomplishments. When homework is teacher graded the student looses that control. Somehow the research that says homework needs to be graded and commented on (Paschal et al., 1984) needs to be reconciled with this student control or responsibility factor. Homework should not be done for a grade. It should be the preparation that enhances progress toward larger primary learning objectives (Madgic, 1988).

The intervention proposed in this action research places the grading and commenting process in the hands of the student. The strategies used are designed to increase student awareness of their overall grade performance, correlate homework with test grades, and make students conscious of outside influences that may be directly or indirectly affecting their homework options and decisions (Petreshene, 1986) (Glomb et al., 1990) (Stanulonis, 1992). The feedback and assessment of performance done by the student himself/herself during the intervention will, hopefully, enhance the learning

process (Earle, 1992). At the same time, care must be taken to guard against too much grade inflation as a result of faulty student reporting or built in bias (Keith, 1982) (Keith et al., 1992). Homework will continue to be recorded for grading purposes as a "Did you do it, did you not?" grade. The Grade Control Chart itself will be graded on its completeness as a long term project. All zeros will be equally as acceptable as all 100's if the student has completed the documentation and analysis process.

The documentation process should include an explanation, whenever homework has not been done, of the reasons for not doing the homework (Rutherford, 1989). Some students may truly not require the reinforcement that homework provides to learning. This may become evident in the journal (Appendix I) phase of the intervention. What is important is that the student learn for himself/herself what actions result in improved grades and increased understanding of the material presented in the class (Nottingham, 1988).

The writing aspect will cause the student(s) to reflect on the process of doing an assignment and hopefully help bring out the kinds of questions that lead to better process analysis of student understanding (Miller, 1991).

CHAPTER 4

ACTION PLAN FOR IMPLEMENTING THE SOLUTION STRATEGY

Description of Problem Resolution Activities

The action plan is designed to address the value students place on careful and timely homework completion as it relates to their success in the second year Fundamental Algebra course.

The implementation plan is presented below in outline form. It appears in chronological order where possible.

1. Adapt the Grade Control Chart (GCC) (See Appendix E) (Kimmel, 1992) for use with the target group.

   A. Who: Researcher/teacher was responsible for modifying the GCC.

   B. What: The chart needed to be modified and reproduced for use with both homework and test items. It needs to include space for recording raw grade data, percentages and journal comments.

   C. When: This was accomplished during the summer and early fall of 1993.

   D. Where: Revision work took place at the researcher's offices at home and at the high school. Copying was done at school when possible.

E. How: Grade Control Chart has been modified in accordance with ideas gleaned from similar student reporting systems and standard Statistical Process Control charts (Beaman, 1993) in accordance with statistical curriculum topics normally presented during the second year of Fundamental Algebra (Glomb et al., 1990). The chart used is very similar to a run chart which is used to display data in time order as well as information about what happens to a process over time (Hart, 1987).

F. Why: This Control Chart is the primary tool for the intervention. Because of its similarity to a run chart, it is hoped that it will provide the student with evidence of any non random patterns to his/her work (Hart, 1987).

2. Survey tools needed to be further developed.
   A. Who: Teacher/researcher was responsible for this.
   B. What: The questionnaires were piloted and approval was sought for same from the building administrators.
   C. When: This was accomplished during the summer of 1993 and culminated during the latter weeks of September 1993.

3. Students should be given journal writing assignments (McIntosh, 1991).
   A. Who: All students in both the target and control classes participated in journal writing assignments.
   B. What: Journal writing assignments were used to process cooperative lessons as well as homework assignments and worksheet activities (Mett, 1987).

C. When: This began with the first day of classes in September 1993 and continued throughout the year.

D. Where: This took place within the classroom.

E. How: Short writing assignments were included in classroom work at least twice a week.

F. Why: The explanation of the Grade Control Charts is a major part of the valuing activity. These early exercises were helpful in getting students used to such writing in math. Since many people employed in jobs related to math indicate that they spend as much as 30 percent of their time writing this is an important skill to practice (Mett, 1987) (Glomb et al., 1990).

4. Students were introduced to goal setting.

A. Who: Teacher/researcher accomplished this.

B. What: Goal planning lesson was facilitated.

C. When: Within the first few weeks of school goal planning was discussed. It has been included in any problem solving setting.

D. Where: This has been done in both the target and control classes.

E. How: This will be done through classroom discussion and questioning. Every problem has been modeled with the questions: "What are we trying to accomplish here?" and "What is the goal?"

F. Why: Goal setting is an integral part of the Grade Control Chart. A goal must be established in order to have something to compare against.

5. Teach the regular unit on coordinate graphing followed by a mini-unit on statistical graph interpretation.

A. Who: The teacher/researcher developed this unit using textbook as well as outside sources.

B. What: A unit on statistical interpretation needed to be developed.

C. When: The unit was developed for use in mid-October 1993.

D. Where: At home or in curriculum meetings.

E. How: Materials taken from the news media and new curriculum materials were used along with materials from the Algebra with Pizzazz series published by Creative Publications and the Quantitative Literacy Series materials published by Dale Seymour Publications.

F. Why: This unit gave students some idea of the bigger picture of the uses of statistical interpretation and addressed one of the new NCTM Standards. At the same time, students developed the skills needed to record their homework on the Grade Control Charts to be used as the intervention tool.

6. Survey made of students, parents and other math teachers. (Foyle et al., 1986)

A. Who: Students, parents and district secondary math teachers will be surveyed (See Appendices F, G & C).

B. What: Surveys were conducted and the classes used these to develop a statistical presentation.

C. When: This was accomplished during the mini statistics unit in mid October 1993.

D. Where: This took place in both the target and control group classes. These classes meet first and second hours of the school day.

E. How: Students took the parent surveys home as part of a homework assignment. Teachers were surveyed through board mail.

F. Why: The results of these surveys were used to establish baseline attitudinal data within the three surveyed groups. Students used the data as authentic data which they then organized and interpreted as part of the mini statistics unit.

7. Teach a series of lessons on the Grade Control Chart in the experimental class only.

A. Who: The teacher/facilitator led the second hour students through these lessons.

B. What: The students began recording their homework and teacher graded scores on the Grade Control Chart.

C. When: This was done during the first few minutes of the second hour class each day, starting with the second quarter, November, 1993.

D. Where: This took place in the classroom setting.

E. How: The scores of student graded daily homework and teacher graded papers were graphed on the Control Chart.

F. Why: The product is in fact the tool expected to bring about the homework valuing affect. The chart provides a visual representation of the relationship between homework completion and test scores.

Method of Assessment

The most important indicator of the affect of the Grade Control Chart on homework completion will be the students' own journals and the completeness of the individual student's charts. The fewer excuses and the more complete the data points, the better it will be working.

The teacher/researcher will spot check the students' homework notebooks to determine reliability of student grading and reporting. This will be done by randomly re-grading student graded assignments (Rosenberg, 1989). A measurement variation can actually be calculated and expressed in percent of total part (in this case paper) tolerance, using :

$$PTCC = \frac{6(SDC)}{TT} * 100$$

Where PTCC = Percent tolerance consumed by inspection capability
SDC = standard deviation of inspection capability
TT = total tolerance

A PTCC of 10 percent or less would validate the student grading. A PTCC of more than 25 percent would indicate the students are not unbiased graders (Keith, 1982) (Hradesky & Paulson, 1987).

The teacher/researcher will continue a daily check of student homework to determine whether or not it has been attempted and brought to class for discussion. Records will be kept on a seating chart as before (see Appendix A). The tally of homework will be recorded on a yes/no basis (Ropp, 1992).

The percentage of students attempting the homework in each of the classes will be compared to those percentages recorded prior to the intervention. Computation of effect size will be used as one indicator of the intervention's effect on homework completion.

Chapter 5

EVALUATION OF RESULTS AND PROCESS

Implementation History

The terminal objective, or project outcome, of the intervention addressed the low value students place on homework as a means for improving their algebra success rate. Previous years' experience with Fundamental Algebra 3-4 students, in addition to knowledge of this particular group of students' habits from Fundamental Algebra 1-2, indicated that students enrolled in Fundamental Algebra 3-4 classes often do not do the required homework and fall further and further behind as the year goes along. In an attempt to ward off similar results for the 1993-94 school year, the project outcome was stated as follows:

> As a result of the intervention applied in the experimental classroom during the period from November 1993, through mid-January 1994, the students in the Fundamental Algebra 3-4 classes will come to value homework as an integral tool for improving their algebra success. This valuing will be evidenced by a 12 percent increase in on-time homework completion rate. This will be further evidenced by an improvement in student attitudes and responsibility concerning homework as measured by student and teacher journal entries.

The first and second hour Fundamental Algebra 3-4 classes were chosen for implementation of the action research using the Grade Control Chart (GCC). September was devoted to introducing some statistical interpretation and journal writing. Students were given several opportunities to express their thoughts about various homework and in-class activities through journal writing, either by responding to lead questions or through free response. The first part of the chapter on coordinate graphing was presented out of the normal sequence to facilitate later plotting of scores on the Grade Control Chart. Graphs became a year long theme, as most new topics were in some way related to graphic representations.

In late September, homework surveys were filled out by the students in both the control and experimental classes (Appendix F). The students were asked a series of questions intended to shed light on their attitudes and habits concerning homework. A similar, but shorter, survey was sent home to the parents of these students (Appendix G). Once the student and parent surveys were returned, copies of the survey questions and answers were divided among the base groups in each class. The groups were responsible for assembling, displaying and reporting/interpreting the results of the surveys to their classmates. Students prepared overhead slides and short talks to present their findings. This opened the way for a discussion of homework attitudes and student goals.

A third survey (Appendix C) of district high school math teachers was conducted during November and December. These results (see Figure 2) were never shared with the students. Since the results of this survey were not received until after the intervention had been initiated, they were used only to verify that the two classrooms in the experiment were not unusual in their homework requirements and attempts. In fact, 63.3 percent of the

respondents to the teacher survey assign homework on a daily basis and another 16.3 percent regularly assign homework four nights a week. The survey further indicated that these teachers received only about 78 percent of the homework assigned.

There were 50 students who began the school year in the two classes. Twenty-four were in the first hour class, and 26 were in the second hour group. By late September when the surveys went out, three of these students had transferred out of these two classes due to schedule changes or school moves. Two more of these students would transfer out and then back into the class second semester. One student transferred into the class from an upper level course to correct a scheduling error. Four other students were dropped from the two classes. One was withdrawn from school for non-attendance. One transferred to another teacher's class, where this same intervention was on-going. A third student left class when she found she no longer needed the class. The fourth student left school to get married.

While data was produced by forty-five students, only 39 of these students remained in the two classes all year. These 39 students are the ones on whom the results are based. The initial intervention done during the second quarter involved twenty students and a control group that numbered nineteen. Two of the six students who were not included in the results became habitual truants. The data concerning the six missing students was left in the initial spreadsheet (Appendix H-1). It was omitted for the analysis spreadsheets (Appendix H-2 and Appendix H-3) because these six students represent outliers that would significantly skew the results.

In all, 46 students took part in the student survey. All 46 surveys were returned since they were completed right in class. Twenty-eight percent of the students surveyed indicated that they thought homework was very

important to their success in Algebra. Another 32.6 percent agreed that homework was quite important to their success. Only six, or 13 percent, of the students rated homework of little or no importance.

The same forty-six students were given surveys to administer to their parents. To encourage participation, the parent surveys were considered a homework assignment. Students were given credit for returning a sealed envelope. A cover letter accompanied the parent survey explaining that the response would become part of a student statistics project. Parents were also told that their responses would become part of this Action Research.

Not every student returned a parent survey. Of 46 parent surveys sent out, 39 envelopes were returned. Four envelopes contained blank surveys. Two envelopes were empty. There were actually 33 parent surveys filled out. There was no verification process to protect against the student filling out the parent survey.

Parent responses ranged from those who felt homework was important enough to be given every night to those that thought 15 minutes, once a week was enough. No one expressed the idea that homework was unimportant, though some may have expressed unrealistic time expectations. The majority of the parents responded that they expected their children to have algebra homework two or three nights a week. This expectation was certainly in contrast to the teacher survey results where most teachers responded that they gave homework every day. One surprise in both the student and parent surveys was the fact that few of the students held down jobs that might interfere with on-time homework.

During the month of September, the teacher collected data on student homework attempts by checking to see if students had attempted their homework before coming to class. Records were kept on a Did you do it, did

you not? basis. A seating chart was designed especially for that purpose (Appendix A). These records were continued throughout the intervention as a basis for evaluating student attempt rates. These records are also the basis for determining the homework portion of a student's grade.

In early November, coincident with the beginning of the second quarter, students in the second hour Fundamental Algebra 3-4 class began to enter their self graded homework and teacher graded test and worksheet results onto the Grade Control Charts (Appendix E). They entered comments for each assignment in a journal (Appendix I) that was part of the GCC booklet. This was done regularly at the beginning of each class period, while the teacher circulated the room checking homework. To facilitate the self-grading and reduce time necessary to accomplish this, the answers to even numbered problems were displayed on an overhead as students entered the classroom. The textbook already contained answers to the odd numbered problems.

Students in the control group were encouraged to record their grades on their assignment calendars as they had always done. Assignments were numbered to indicated whether they were student graded (A-1, A-2, A-3...) or teacher graded (T-1, T-2, T-3...). This numbering method was later abandoned for a simple consecutive numbering system. The original assignment designations were too cumbersome and confusing, and took too much class time. The assignment numbers were designated on the assignment calendars in every student's possession.

It became necessary to review the process for figuring percentage scores on these assignments. The GCC contained an area for recording the number possible in a given assignment, n; the number correct in a given assignment, c; and the percent. The number correct was easy to find since all

the student needed to do was count the number right. It was soon apparent that most students were used to counting up the number wrong. The number possible was a puzzle to many students, especially when the assignment did not start with number one and proceed through consecutively numbered problems. A little time needed to be spent proving to the students the method for finding the number possible, something other than just counting. One outcome that was not really anticipated was that every day the students had to figure one interval problem as well as one percent problem. Even the percents regularly came into question. The students often did not want to believe what they figured. This was the first time many of these students had faced the reality of percent. The cry often heard was "That can't be! I only missed two problems out of ten and I got an 80 percent".

As part of the journal entries, students in the experimental group were encouraged to point out specific areas in the assignments where they had had success as well as record those areas where they needed to get further information. Those students failing to do the assignment or not completing the assignment were asked to record their reasons for not doing the homework. Students not having the homework on the day it was due were asked to record a zero and indicate the reason for not getting the work done on time. This procedure was followed even if the reason was a legitimately excused absence and the homework would later be made-up and credit awarded.

The Grade Control Chart was included in each student's grade only to the extent that entries were counted and compared to the possible number of entries over a given period of time. An entry explaining that the student received a zero on an assignment, because he/she forgot to do it, counted as

much as an entry of 100 percent with a journal entry that explained what the student found easy or difficult about the assignment.

Students in the experimental group were encouraged to analyze their GCC's with respect to the grades they were earning and asked to establish goals for their work. Two students established goals the first day. Most were interested in the rise and fall of their charts, but few placed any significance on the picture of their work until it was pointed out to them during a discussion of averages. Even after seeing a visual representation that every peak was brought lower by a valley, most of the students did not really relate that to their work. Perhaps they did not see what they could do about it. It became apparent that defining a range of acceptable grades was not going to be a natural consequence of this process.

When the initial experimental period came to a close in January, most of the students in the experimental class asked to continue the charts. For whatever reason, they found the charts interesting enough to want to continue them. Some few students expressed the idea that the charts were wasting a lot of class time. These same students had little to do on the charts because they seldom did their homework.

It was decided that the control group needed to be exposed to this process as well. Starting with the third quarter, both classes were using the GCC to track their progress in the class. The control group caught on to the process faster than the experimental group had done earlier in the year. That could have something to do with the change in the assignment designations. Then too, they were already used to figuring intervals and percents because of their calendar records. The only new aspects were the daily plotting of a single point on the GCC and the daily journal entries.

Students in both classes were asked to consider their first semester grade and make new goals for what they would like to achieve during the third quarter. A lesson on averaging was again presented to the students using sample grade control charts created during the second quarter. During informal conferences with each student from the experimental class, the teacher related the student's individual grade to the picture he/she had plotted on the grade control chart. The GCC was not available to use as a show and tell for the control group members. The students again stated very general goals, not yet relating these to the GCC itself.

The two classes are now recording grades for the fourth quarter of the year. Students in both groups have finally begun to define their goals in terms of a horizontal line on the GCC below which they do not wish their grades to fall. The idea of setting a goal on the GCC seems to have been the hardest part of this process. Continued oral readings of sample journal entries to the whole class has gotten more of the students to think in terms of writing these entries for themselves and not for the teacher. More of the comments in the journal relate to questions that need answering and work that needs practice. There are fewer excuses, though the excuses are useful, too, in analyzing what gets in the way of homework.

Presentation and Analysis of Project Results

During the first 5 weeks of school, when only the observation of the situation was taking place, the control group posted an average 76.668 percent attempt rate for homework, as indicated by records the teacher kept of whether or not the students had the assignment in class on the required

day. For that same period, the experimental group posted a 72.21 percent attempt rate. Thus there was a 4.458 point gap between the attempt rates for the two classes at the time the baseline was determined (Appendix H-1, H-2, and H-3). The assumption was made that these percentages would remain about the same without intervention.

By the end of the first quarter it was apparent that this assumption was not valid. The control group's homework attempted rate had dropped to 64.858 percent, a rate of decrease of 15.4 percent. The experimental group had dropped to an attempted rate of 53.38 percent, representing a rate of decrease of 26.08 percent. While homework levels in both groups were dropping, the class intended as the experimental group had dropped at an accelerated rate, widening the gap between the two classes to 11.478 points.

The intervention, a Grade Control Chart (GCC), was introduced into the experimental group at the beginning of second quarter. Three weeks into this new quarter, the control group was again posting a homework rate of 75.111 percent, almost as good as the first 5 weeks and a definite 15.81 percent increase over the overall first quarter rate. The experimental group had posted a 54.995 percent homework attempted rate, representing an increase of 3.03 percent over the first quarter average. For the moment the decline had stopped. It should be noted that parental concern was running high, as report cards had been issued recently.

Over the next six weeks, while the intervention was in place in the experimental group, the control group's work continued to rise and fall, ending the second quarter with a homework attempted average of 66.6 percent. During that same time, the experimental group's average leveled off at 54.17 percent for an ever widening gap of 12.43 points between the two classes. Both groups had shown a modest increase over their first quarter

average. None of that increase appears to be related to the GCC. In fact the class using the GCC had the smallest increase. In addition, a computation of the effect size for the second quarter indicates no practical significance for this intervention. The effect size for the second quarter is -0.608. It can be concluded that the GCC had not succeeded in improving the on-time completion rate of homework by 12 percent during the planned intervention period. In fact the on-time rate continued to decline.

In late January 1994, with the experiment now officially over, it was decided to at least expose the control group to the GCC. Observation records continued to be kept for grading purposes. During that third quarter the experimental group continued to decline in homework attempted as did the former control group. This time something new was noted. The control group's attempted rate was declining much faster than the experimental group's attempted rate. By the end of the third quarter, the homework attempted averages of the two groups were within 4.044 points of each other. The first hour control group had dropped to an attempt rate of 50.589 percent, while the second hour experimental class had dropped to 46.545 percent. The experimental class had shown an overall drop of 12.80 percent since the intervention began. The first hour control group had lost 22.00 percent in that same period. The apparent effect size for the third quarter is -0.170.

To get a better picture of what was happening, students in the two groups were divided into three categories based on their homework attempted rates. Category I included students who attempted between 80 and 100 percent of their homework. Category II included students who attempted 60 to 79 percent of their homework. The remaining students, grouped in Category III, attempted too little homework to earn a passing grade even if that grade were based solely on homework attempts (see Figures 6 and 7).

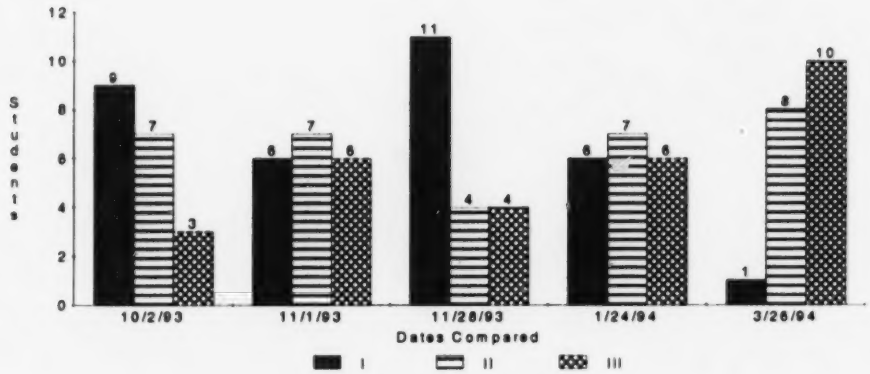


Figure 6
First Hour Control Group Distribution
Categories of Homework Attempts

N = 19

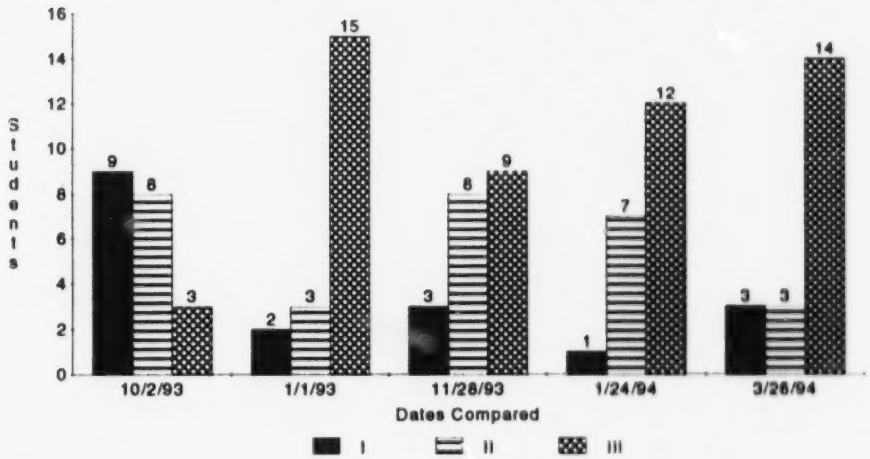


Figure 7
Second Hour Experimental Group Distribution
Categories of Homework Attempts

N = 20

During the initial observation period in September, both classes had nine students in Category I (see Figures 6 and 7). At the end of the second quarter the control group had six students in Category I (Appendix H-2).

Four of these were from the original group. Two students had pulled themselves into Category I. The experimental group had experienced a lot more change. All nine of its students originally in Category I had dropped. Only one student climbed into Category I by the end of the second quarter (Appendix H-3).

During the third quarter, two more students in the second hour experimental class had climbed into Category I, for a total of three students (Appendix H-3). The first hour control group, now also using the GCC, had only one remaining student in Category I. All other students had stayed the same or lost ground. By the end of the third quarter the control group posted one student to Category I, eight students to Category II, and 10 students to Category III. The second hour experimental group had three students in Category I, three in Category II and 14 in Category III.

Student comments continue to demonstrate a wide range of attitudes toward the Grade Control Chart, its accompanying journal and homework. The following comments came when students were asked how they felt about the Grade Control Charts. The words, spelling and grammar are the students.

> I don't mind the grade control chart, it is kind of boaring sometimes and when you get behind in putting things on it there is like no way to catch up. but overall it helps some people out...at least I think it dose.

> I think the grade control chart was a pretty good idea because we can all tell you about our homework an the troubles we had with it without all coming up to you and saying it all at the sametime. It has helped me to keep tabs on my homework and to find out my grade in class. I think I'm doing much better in class. I get the work.

I really don't care for the grade control chart. In a way it's nice to see how your grade's doing! But, in a way it's kind of just a lot of trouble.

I do fine on my homework. I don't see how the grade control chart helps or doesn't help. It doesn't matter to me. It's the tests I freeze up on. I keep record on my spiral as it is, so I think I'm doing good either which way.

It has helped me because I can see how well or bad I'm doing in this class. And it tells me what assignments I am missing. And yes it has had an affect on my homework because I don't like seeing zeros in my chart so I do my homework and get higher grades.

I think the grade control chart has helped me with my homework - alot. The reason I say this is because, I do my homework and 100's on them so my chart won't look slopy with a bunch of 0's. So I try to keep 100's on my chart to make it look good! Plus, doing my homework everynight helped on the test today. I should have done my work a long time ago!

I really don't care about the Grade Control Chart one way or another. It does not massivly affect my life in anyway. It is a mineute inconvience, which simply takes more time in our class period.

The Grade Control Chart has helped but I really don't think we should keep it up because it is hard to fill it in every day.

Yes the grade control chart is helping me. I can see what my grades are all mixed up and stuff.

I don't like doing the grade control chart. I don't see what the point of it is.

I don't like it. I found out I don't do my homework.

> The grade control chart is helpful. It shows me that I need to do my homework and that I do good in my work I just don't do my work enough. I would like to continue this. No one can blame anybody but themself.
>
> The grade control has helped my quite a bit. It helps me realize what I have done, and what I haven't done. The Journals are helpful, and needful, because you can tell you exactly whats on my mind. Thank you for the GCC because I can actually see my grade and express myself.

And one last comment from a student who sees both sides of this question:

> I think it is good, but you have to get kids to do some of the writing. Its kind of a waste of time for people that do 1 HW assignment a week or less, I know. Other than a waste of time it helps alot if you accidentely missed one of our test scores or something to that effect. Just continue with it is what I'm trying to say, kids will catch on. if not oh well it works.

Student attitudes were one criteria for judging the success of the intervention. As the preceding sample quotes indicate, those student attitudes are mixed. The desired effect was not accomplished with every student. Admitting that homework is important is scary. It means changing how homework is treated. It means a student must do homework more conscientiously if he/she wants to improve his/her grade in algebra.

This action research began by looking for a 12 percent gain in homework completion or at least attempts. This result was never achieved. It soon became evident that the intervention would be successful if the loss was minimized. The project to improve student completion of homework has evolved instead into a tool for better understanding what makes some students survive in algebra. It has given the researcher a better understanding

of the part perseverance plays in intelligence and the pursuit of a subject. Those students who allowed themselves to be defeated early on, or who entered the class defeated had a self fulfilling prophecy.

The "Why bother? I just do not get it!" attitude came through loud and clear and it soon became very true for some students. The snowball affect of not having done yesterday's work only made today's work that much harder. Hopelessness seems to play the greatest part in this whole process. This hopelessness has never been quite so evident as this year when those students who failed the first semester were not allowed to bail out as they had done in past years.

A Grade Control Chart will not overcome the hopelessness of past failures. It only serves to highlight that hopelessness and increase the pain for some students. That does not mean that it does not have a place in an algebra classroom. Certainly the journal aspect and the record keeping aspect have value on their own. Those students who really bought into the journal have started using it to direct their studying. They are beginning to take some responsibility for what they learn.

It remains to be seen whether the initial goal of increasing student value for homework will be a long term outcome for everyone exposed to the GCC. There appears to be no significant short term outcome for more than a few of the students involved in this intervention.

This study is being continued through the rest of the school year. The GCC warrants further use in algebra classes, if only as an application of graphing and averages. This process should be used again next year as a record keeping project. This is the way it has been used in some applied math classes. If used with freshman algebra classes the case for a connection

between homework attempted and success in algebra may be made earlier in the algebra sequence.

Solving the homework problem in algebra is going to require more than a grade control chart. Attitudes expressed in the parent and student surveys indicate that many place a low priority on homework. Students and parents need to see some relationship between homework and achievement. While this study did not find the grade control chart to be the answer in developing this relationship, it may prove to be part of the total picture that needs to be presented.

Chapter 6

REFLECTIONS FOR THE FUTURE

The Solution Strategy

At once, the advantage and the disadvantage of the Grade Control Chart is its dependence upon student grading and student analysis. The hope was that students would develop a sense of control over their own grade by seeing how their homework affected their progress.

Even with the early lessons on graphing, it took a little while for the students in the experimental group to become comfortable with the graphing process. The most difficult part of the graphing, however, was figuring the percents. Students seemed to get confused very easily. Even after several weeks, some students had to ask which number got divided by which number. The chart had purposely been designed so that the number correct was recorded above the number possible to avoid this confusion. I believe this confusion is indicative of just one of the problems this particular group of students is having with surviving algebra. Their computational skills lag far behind those expected of algebra students. More importantly, their ability to follow and remember directions is very weak. The same lesson had to be taught almost every day.

Finally after three quarters, the computational confusion has subsided. Occasionally a student still has trouble with the interval problem, figuring out how many problems were possible.

One concern that is always present when students grade their own papers is the honesty factor. Spot checks of student work done by collecting student graded homework and re-grading it, indicated that the students were relatively honest in their self-grading. The original plan to compute a Percent of the Total Part Tolerance (PTCC) to test that honesty was abandoned in favor of the less formal checks of sample homework assignments when it was realized that setting a total tolerance level (TT) was at best awkward and samples had not been sufficient to compute the process inspection capability.

There were four classroom teachers doing this same project or a variation of it in four separate interventions. Two of these were doing this with middle school students, one with eighth graders and one with seventh graders. The other two were using the intervention at the high school level with students ranging from sophomores to seniors. All seemed to experience a lot of confusion with the mechanics of the GCC. The middle school teachers experienced some difficulty with the charting process itself. They were further hampered by an even shorter class period of 45 minutes. The charting did not seem to be as confusing as the computation of percent in my two classes.

Now that the experimental class has finally gotten the idea of the process, it would be interesting to track this just a little longer. It may be that one or two quarters is not enough time for the grade control chart to have any real effect. One quarter is barely enough time to collect sufficient data to establish limits. Usually twenty to 25 samples are needed to establish the limits in industry (Miller & Freund, 1977). The initial run involved only about 30 samples. The baseline set at the end of first quarter did not involve any charting of scores.

People in quality control who regularly use Statistical Process Control (SPC), on which the GCC is based, indicate that it takes anywhere from fifty to 400 plots to get a picture of what is happening (B. B. Beaman, CQE, personal communication, February 19, 1994). Four hundred plots on any given student during the year would be impossible. Even the 50 plots would take more than one quarter.

The fact that the control group seemed to drop so fast after implementing the GCC is offset some by the fact that the experimental group's decline began to slow. This may be only coincidental. Still, because of the relatively small number of data points, I would be interested to see how this process might work if continued with an already trained group of students.

One of the complications that had to be dealt with was the matter of absences. While provision was made for dealing with late assignments due to absences, the absences still took their toll on the intervention. It is hard to get an accurate picture of a student's work when the work has not been done yet due to absence. But then that has always been true. The one thing the GCC made obvious to the students was how many gaps they really had in their learning. This began to come through in some of the journals as students wrote more than just absent next to an assignment.

Along with the normal health related absences, truancies and out of school suspensions, third quarter experienced some rather long absences due to matinee performances of the Spring musical, field trips and six days of IGAP testing. All of these affected the second hour experimental class. With so many students dropping in and out of class when they had nothing better to do, it is a wonder the results were not worse than they were. The GCC provided a good reminder to students about missing assignments. Several

students made that point in their journals and the critiques of the Grade Control Chart.

On one occasion a student refused to write in his journal, actually throwing the notebook back at me and saying: "No I don't have to do that. It's your fault I didn't get my work done. You didn't explain it well enough yesterday, so I've got nothing to write". I finally got this student to record in his Grade Control Chart and journal when I told him he had a lot to write, that he needed to write exactly what he had just told me. He did write that and more hoping to hurt me. My guess is, this student had found the GCC painful because he had to admit that he needed help. It was easier to blame me. After blaming me several days in a row, he began to realize that he was not doing his part. He had taken no classroom notes, copied down no sample problems and had talked during the explanations. I can not be sure that the Grade Control Chart has helped this student, but I am not hearing or reading the same excuses from him.

Another apparent form of refusal that has surfaced seems to be forgetfulness. The students had been instructed not to remove their GCC's from the classroom. In order to make sure I had the charts for analysis, I collected and passed out the charts daily. Still some students managed to remove their charts from the classroom and conveniently leave them at home or in their locker for extended periods. These were, in most cases, the students who later became truants.

Were I to use this intervention again I would want the folders to be readily accessible to the students as part of their regular math notebooks. I believe they would take on more meaning. Those students who began to see the journal as notes to themselves, instead of to me, expressed more satisfaction with the process. Also, by being able to take the GCC home,

more students might find their parents interested in talking about how they use a similar tool on their jobs. This, of course, assumes that the students talk to their parents. The need to keep the charts in the classroom may have prevented this important aspect of the intervention.

The goal setting aspect of the intervention never really took hold. When two students set goals the first week, I thought this would be a natural. Unfortunately, no other students set goals until the end of third quarter when I required them to mark their goals with a horizontal line on their chart. This horizontal line was meant to represent the student's lower limit for acceptable grades. As yet students have not generally taken responsibility for maintaining grades above this lower limit. Grades, it seems, are something the teacher gives out in some mysterious way with no relevance to what the student does or does not do. The Grade Control Chart has not dispelled that idea as I had hoped it would.

For this intervention I had asked the students to combine teacher graded papers with student graded homework on the same GCC. This led to a lot of confusion trying to keep the two straight. Initially two different numbering systems (A-1,A-2,... and T-1, T-2...) were used. This only added to the confusion. As indicated in Chapter 5, changing to a straight consecutive numbering system helped. The original plan of just using dates was abandon because those often had to be changed due to unexpected schedule changes. I think a better way to deal with this would have been to have students plot only their homework. By plotting tests and worksheets separate from homework and overlaying the two graphs, more direct cause and affect might be noted between daily preparation and tests.

Applications for the Future

While attending an Applied Math workshop (Bob Prout, personal communication, March 24, 1994), I was surprised to see the presenter display a chart very similar to the GCC and suggest its use. He was not suggesting this as a way to discover any great truth about homework. He was suggesting another application for graphing. He said, the chart had relieved him of any need to ever answer the question "How am I doing?" His answer was always to direct the student to his/her self generated chart which had more information on it than the teacher had. Similar questions from parents brought a similar response as he told them to ask their child to see the chart.

The comments made at the applied math workshop have encouraged me to continue this study throughout the rest of this school year. The GCC warrants further use in my algebra classes, if only as an application of graphing and averages. I would like to try this process again next year as more of a record keeping project. Next time I would like to start with the freshman algebra classes. Hopefully the case for a connection between homework attempted and success in algebra can be made earlier in the algebra sequence.

The goal setting aspect of this intervention should be strengthened in future applications. Students should be encouraged to make mid-course corrections in their study habits based on the GCC.

Technology could be introduced into this process by having students do their graphing on a computer spreadsheet. This would eliminate some of the confusion in the graphing process since data would be entered as a list of numbers with the spreadsheet doing the actual graphing. Students would have a professional looking tool for analysis of their grades. The analysis

would then take precedence over the mechanics. This graph could easily be incorporated with student progress reports at any time.

Dissemination of Data and Recommendations

There are no plans at this time to dispense the information developed by the Grade Control Chart's application to mathematics classes in any formal manner beyond this action research paper. Results will be displayed as part of the Field Based Masters Program exhibit in May 1994.

Other members of the mathematics department in which this study was conducted will receive an informal inservice on the mechanics of the GCC and be encouraged to try it in their classrooms as part of the Connections 2000 program scheduled for implementation during the 1994-95 school year. Connections 2000 is a Tech Prep based program that calls for cross-curricular application based presentation of learning experiences.

As a member of the Tech Prep/Connections 2000 team, I see the GCC as a good way for math to interact with a number of different disciplines, most notably English, computers, industrial arts, physical education and social studies.

Plans have already been made to share the results of the intervention with professionals engaged in quality control consulting and education. A consultant for Schorr Training and Consulting has expressed an interest in the results. Data will also be shared with a staff member at Rock Valley College's Technology Center. Both consultants are working with the American Society for Quality Control Education Division.

References Cited

Anderson, B. et al. (1986, December). Homework: What do national assessment results tell us? (Report No. MAEP-15-R-03). Princeton, NJ. National Assessment of Education of Educational Progress, (ERIC Document Reproduction Service No. ED 276 980)

Artzt, A. (1987). Collecting homework: A lesson in randomness. Mathematics Teacher, 80, 610-612.

Auburn High School. (1992). (Contract No. 04-101-2050-0001) Rockford, IL: Rockford Board of Education.

Auburn High School. (1993). 1993 School Report Card.

Baratta-Lorton, B. (1978). Mathematics...A way of thinking newsletter.

Barber, B. (1986). Homework does not belong on the agenda for educational reform. Educational Leadership, 43, 55-56.

Beaman, Barry B. Personal interview. 25 September 1993.

Bergstrom, J. (1985), Letters home about homework, Instructor, XCV, 78-80.

Bonfiglio, J. (1988). Evolution of a model homework policy and practice statement. NASSP Bulletin, 82, 18-23.

Braswell, J. (1985). One point of view: Improving performance. Arithmetic Teacher, 32, 1, 38.

Canter, L. (1988). Homework without tears. Instructor, XCVII, 28-32.

Chen, C. & Stevenson, H. (1989). Homework: A cross-cultural examination. Child Development, 60, 551-561.

Cole, P. (1991) Children at work: peril or promise? Albany, NY: New York State AFL-CIO. (ERIC Document Reproduction Service No. ED 335 452)

Cooper, H. (1989). Synthesis of research on homework, Educational Leadership, 47, 85-91.

Dean, O. (1989). Facing chemical dependency in the classroom. Deerfield Beach, FL: Health Communications, Inc.

Doyle, M. & Barber, B. (1990). Homework as a Learning Experience. What Research Says to the Teacher. Washington, D. C. National Educational Association. (ERIC Document Reproduction Service No. ED 319 492)

Earle, R. (1992). Homework as an instructional event. Educational Technology, 32, 36-41.

Easton, J. Bennett (July 1990). Achievement Effects of Homework in Sixth Grade Classrooms. Chicago, IL: Chicago Public Schools (ERIC Document Reproduction Service No. ED 320 675)

Elawar, M. & Corno, L. (1985). A fractional experiment in teachers' written feedback on student homework: Changing teacher behavior a little rather than a lot. Journal of Educational Psychology, 77, 162-173.

Featherstone, H. (1985). What does homework accomplish?. Principal, 65, 6-7.

Fehrmannn, P. & Keith, T. & Reimers, T. (1987). Home influence on school learning: Direct and indirect effects on parental involvement on high school grades. The Journal of Educational Research, 80, 330-336.

Foyle, H. (1986). Homework: The connection between school and home. NASSP Bulletin, 84, 36-36

Foyle, H. & Bailey, G. (1986). Homework: Its real purpose. The Clearing House, 60, 187-188.

Foyle, H. & Lyman, L. (1989). Homework research, policy, and implementation. Orlando, FL. 44th Annual Conference of the Association for Supervision and Curriculum Development. (ERIC Document Reproduction Service No. ED 303 919)

Friedman, M. (1991). A strategy for beginning class. Mathematics Teacher, 84, 538-539.

Goldman, S., McQueen, T., & Little, B., Homework sweet homework, (1884), *Instructor,* XCIV, 38-42.

Glomb, N. & West, P. (1990). Teaching behaviorally disordered adolescents to use self-management skill for improving the completeness, accuracy, and neatness of creative writing homework assignments. Behavioral Disorders,15, 233-241.

Hart, M. (1987, March). Use of the run chart. QUALITY. pp. 87-88.

Herman, M. (1983). Hopeless in math? It's too soon to say. Mathematics Teacher, 76, 515-523.

Horner, C. (1987). Homework: A way to teach problem solving. Academic Therapy, 22, 239-244.

Hradesky, J. & Paulson, W. (March 1987). SPC's missing link. QUALITY. pp. 55-57.

Jackson, B. (1985). Lowered expectations: How schools reward incompetence, Phi Delta Kappan, 67, 304-305.

Johnson, C. (1989). The association between testing strategies and performance in college algebra, attitude towards mathematics, and attrition rate. School Science and Mathematics, 89, 468-477.

Jongsma, E. (1985). Homework: Is it worthwhile? The Reading Teacher, 38, 702-704.

Keith, T. (1982). Time spent on homework and high school grades: A large-sample path analysis. Journal of Educational Psychology, 74, 247-252.

Keith, T. & Benson, M. (1992). Effects of manipulable influences on high school grades across five ethnic groups. Journal of Educational Research, 86, 85-93.

Keith, T., Reimers, T., Fehrmann, P., Pottebaum, S., & Aubey, L. (1986). Parental Involvement, homework, and TV time: Direct effects on high school achievement. Journal of Educational Psychology, 78, 373-380.

Kimmel, M. (1992). Learning from industry: Using quality control techniques to monitor and motivate student progress. The Statistics Teacher Network, 31, 1-4.

LaConte, R. (1981). Homework as a learning experience. What research says to the teacher., National Education Association, Washington, DC, (ERIC Document Reproduction Service No. ED 217 022).

Lee, J., & Pruitt, K. (1979). Homework assignments: Classroom games or teaching tools? The Clearing House, 53, 31-35.

Lieberman, L. (1983). The homework solution. Journal of Learning Disabilities, 16, 435.

Loewer, W. (1989). The relation between pop-quizzes & homework performance. College Station, TX.: Department of Education Curriculum and Instruction Texas A&M University. (ERIC Document Reproduction Service No. ED 312 227)

Lopez, C., Sullivan, H., & Weber, S. (1988). Developer intent versus instructor delivery in program implementation. Journal of Instructional Development, 11, 13-18.

Madgic, R. (1988). The point system of grading: A critical appraisal. NASSP Bulletin, 82, 29-34.

Mafi, M. (1989, April). Involving students in a time-saving solution to the homework problem. Engineering Education, 79, 444-446.

Marquis, J. (1989). What can we do about the high D and F rate in first-year algebra? Mathematics Teacher, 82, 421-425.

McIntosh, M. (1991, September). No time for writing in your class? Mathematics Teacher, 84, 423-433.

McLean, E. (1993). Steps to better homework. Mathematics Teacher, 86, 212.

Meeks,K. (1991, March). Tips for beginners. Note taking in mathematics class. Mathematics Teacher, 84, 90-91.

Mett, C. (1987, October). Writing as a learning device in calculus. Mathematics Teacher, 80, 534-537.

Miller, I., & Freund, J. (1977). *Probability and Statistics for Engieers* (2nd ed.). Englewood Cliffs: Prentice-Hall, Inc.

Miller, L. (1991, October). Writing to learn mathematics. The Mathematics Teacher, 84, 516-521.

Moskowitz, F. (1988). Help parents boost kid's study skills. The Executive Educator, 10, 26.

Murphy, J. & Decker, K. (1990). Homework use at the high school level: Implications for principals. NASSP Bulletin, 84, 40-43.

Nadler, M. (1987). Homework reviews - A better way of communicating. Mathematics Teacher, 80, 726-727.

Nottingham, M. (1998). Grading practices - watching out for land mines. NASSP Bulletin, 82, 24-28.

Palardy, J. (1988). The effect of homework policies on student achievement, NASSP Bulletin, 82, 14-17.

Parkhurst, K. (1989). Improving homework performance at the junior high level. Nova University. (ERIC Document Reproduction Service No. ED 308 975)

Paschal, R., Weinstein, T. & Walberg, H. (1984). The effects of homework on learning: A quantitative synthesis. The Journal of Educational Research, 78, 97-104.

Partin, R. (1988). Home that helps. The Clearing House, 60,118-119.

Pendergras R. (1985). Homework: Is it really basic? The Clearing House, 58, 310-314.

Petreshene, S. (1986). Management made easy. Instructor, XCVI, 70-74.

Otto, W. (1985, May). Homework: A meta-analysis. Journal of Reading, 764-766.

Rockford Area Council of 100. Rockford Illinois Facts, August, 1992.

Ropp, C. (1992). Solving the homework dilemma. Mathematics Teacher, 85, 536.

Rosenberg, M. (1989). The effects of daily homework assignments on the acquisition of basic skills by students with learning disabilities. Journal of Learning Disabilities, 22, 314-321.

Rutherford, W. (1989). Secondary school homework practices: Uses and misuses. San Francisco, CA. Annual meeting of the American Research Association in San Francisco. (ERIC Document Reproduction Service No. ED 311 051)

Singh, B. (1987). Homework and homework hotlines: Views of junior high school students, teachers, and parents. ERS Sprecrum, 5, 14-18.

Stanulonis, J. (1992). Student generated scorecards. Mathematics Teacher, 85, 196.

Stiles, J. (1992). The unstudious American: Who's at fault? Educational Leadership, 49, 61-63.

Trapp, B. Rockford Public Schools Fall Housing Report Summary. September 1992

Turvey, J. (1986). Homework - its importance to student achievement. NASSP Bulletin, 84, 27-35.

U. S. Census Report. (1990). Washington, D. C.

Walberg, H., Paschal, R. & Weinstein, T. (1985). Homework's powerful effects on learning. Educational Leadership, 42, 76-79.

Walberg, H., Paschal, R. & Weinstein, T. (1986). Walberg and colleagues reply: Effective schools use homework effectively. Educational Leadership, 43, 58-59.

Weiss, S. (1992, May). Kids at work. NEA Today, p.3.

APPENDICES

Appendix A

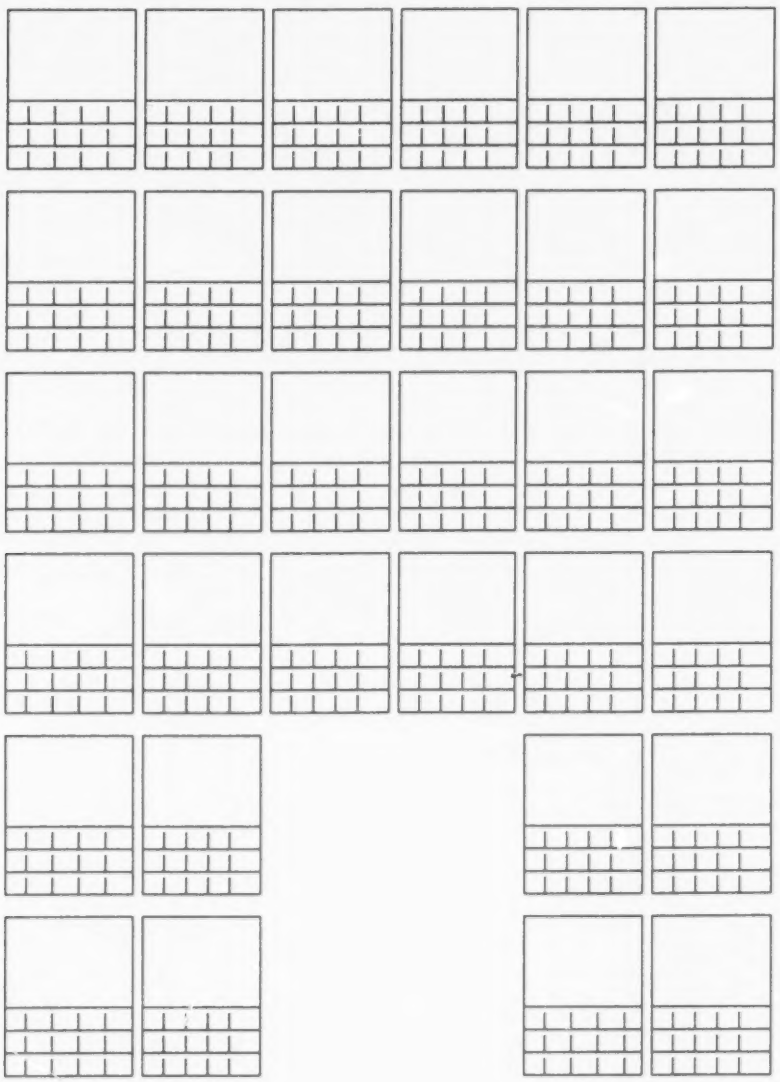
HOMEWORK RECORD/SEATING CHART

HOUR_____

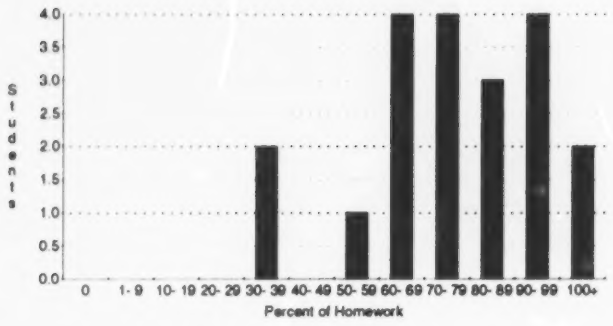
MON._____ TUES._____ WED._____ THURS._____ FRI._____

MON._____ TUES._____ WED._____ THURS._____ FRI._____

MON._____ TUES._____ WED._____ THURS._____ FRI._____

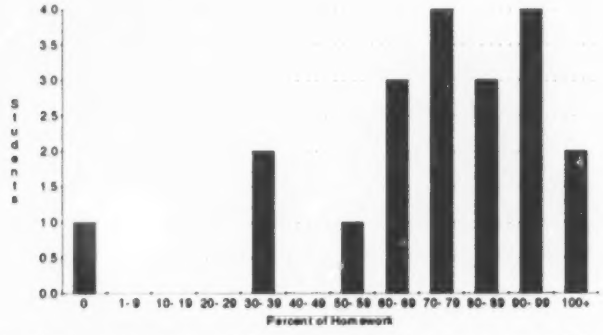


Appendix B



On-time attempt rate of homework in the first hour
Fundamental Algebra 3-4 class for the period
August 31, 1993 to October 1, 1993.

The first hour class had a homework average of 72.835 percent on a Did you do it, did you not? basis during the five week period from August 31, 1993 to October 1, 1993, prior to the intervention. This is the raw average. It has not been adjusted for truancy.



On-time attempts of homework in the second hour
Fundamental algebra 3-4 class for the period
August 31, 1993 to October 1, 1993

The second hour Fundamental Algebra 3-4 class had a homework average of 65.52 percent on a Did you do it, did you not? basis during the five week period from August 31, 1993 to October 1, 1993, prior to the intervention. This average has not been adjusted for truancy.

Appendix C

SURVEY OF MATH TEACHERS AT THE FOUR ROCKFORD PUBLIC HIGH SCHOOLS

PLEASE RETURN THROUGH BOARD MAIL TO:

Carol Beaman or Alice Hack
Auburn High School

(PLEASE CIRCLE THE ANSWERS THAT BEST APPLY.)

1) How often do you assign homework?

DAILY MONDAY - THURSDAY ONCE A WEEK

TWICE A WEEK THREE TIMES A WEEK

I DON'T GIVE HOMEWORK

2) Approximately what percentage of your students attempt their homework regularly?

<25% <50% <75% <90% 90-100%

3) Do you think that homework completion is important to your students' success in your math class?

very important -- not important
5 4 3 2 1

4) Do you collect homework papers?

YES NO SOMETIMES

5) Do you take grades on homework?

YES NO SOMETIMES

Appendix D

Math

The reason I did not ~~[illegible]~~ my algebra homework assignment is because when I got home my friend Sue called w/ a mega-crisis, & I had to talk to her about that. After we hung up, I was completely nerve-wracked about the whole situation. I went up stairs to try & think her problem over, & I brought my homework up too. I ~~started~~ actually did do it, but my mind wasn't focused & it was probably all wrong anyway. But I did finish it, & while thinking I fell asleep. I must have kicked it off my bed during the night & the floor & my room is ~~[illegible]~~ so cleared at all, & now its somewhere on my floor, I couldn't look for it ~~[illegible]~~ in the morning cuz my bus ~~[illegible]~~ & I had to catch it. It's been a bad week so far, but I promise to look for it tonight & bring it tomorrow.

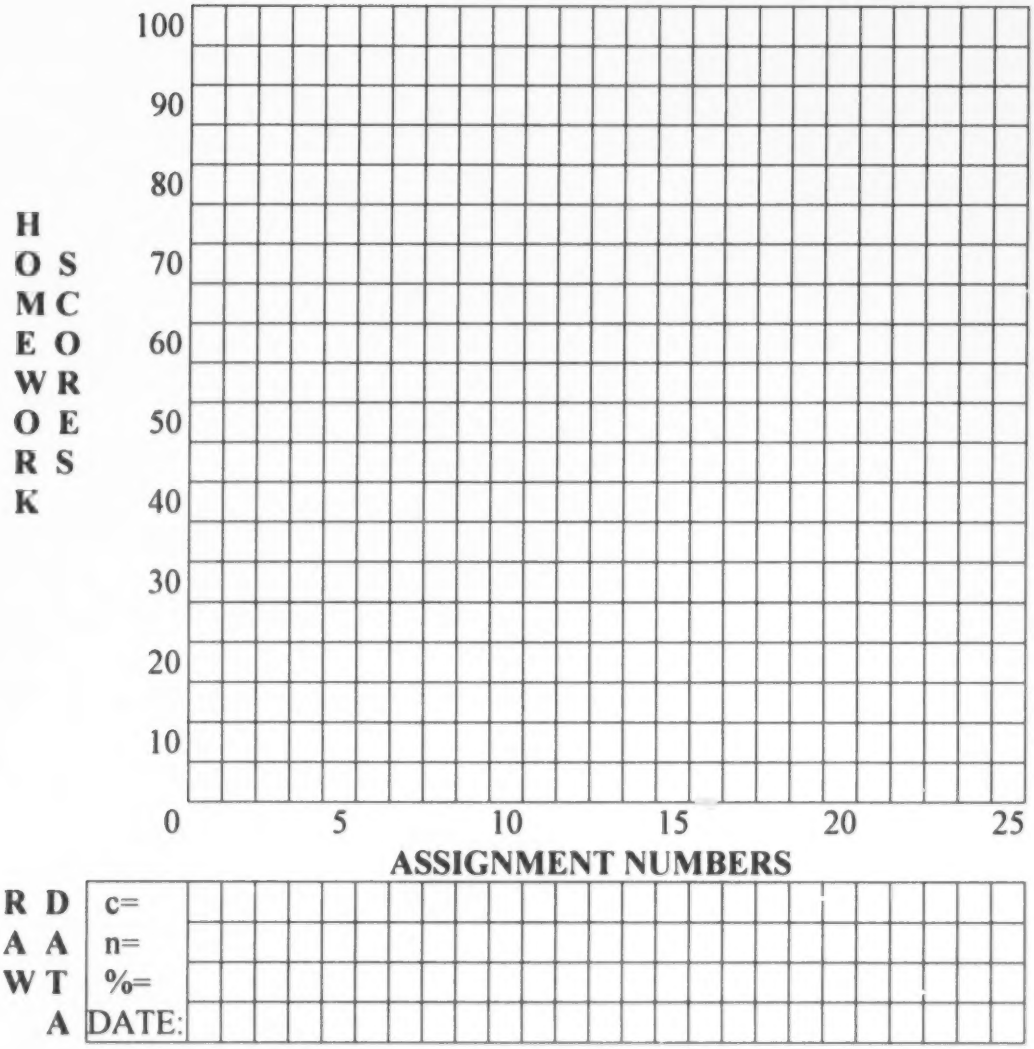
You'd be surprised how many assignments there are like yours. Don't worry about it.

BEST COPY AVAILABLE

Appendix E

NAME:_____

GRADE CONTROL CHART



Plot your homework and test scores on the above chart. Connect the points using a ruler. If you did not bring your homework to class on a particular day, record a zero.

Appendix F

STUDENT HOMEWORK SURVEY

(CIRCLE THE ANSWER THAT BEST APPLIES.)

1) Do you think that homework is important to your success in ALGEBRA class?

very important – not important

5 4 3 2 1

2) How much time do you usually spend on ALGEBRA homework each night?

> 1 hour 45 min - 1 hour 20-30 min 10-15 min no time

3) Does anyone help you with your homework?

YES NO

If "YES", who helps you? Circle all that apply.

TEACHER CLASS MATE FRIEND

PARENT NEIGHBOR SIBLING

TUTOR OTHER FAMILY MEMBER

4) Do you have a specific area at home to do your homework?

YES NO

If "NO", where do you do your homework most of the time?

5) When do you usually do your homework?

6) Do you turn your homework in or at least have it in class on the day it is due?

ALWAYS SOMETIMES NEVER

7) How often do you have homework in other classes?

EVERY NIGHT FOUR TIMES A WEEK

THREE TIMES A WEEK TWO TIMES A WEEK

ONCE A WEEK SELDOM NEVER

8) I do my ALGEBRA homework...

ALWAYS SOMETIMES NEVER

9) How much time do you spend watching TV each night?

> 3 hrs 2-3 hrs 1-2 hrs <1 hr I don't watch TV

10) List a few things that might prevent you from doing your homework.

11) Do you have a job?

YES NO

12) If you answered yes to question 11, approximately how many hours do you work each week?

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Appendix G

PARENT HOMEWORK SURVEY

(CIRCLE THE ANSWER THAT BEST APPLIES.)

1) **Does your student ever bring his/her ALGEBRA book home?**

YES NO SOMETIMES

2) **Does your student ever ask you for assistance with his/her ALGEBRA homework?**

YES NO SOMETIMES

3) **Do you expect your student to have ALGEBRA homework?**

YES NO SOMETIMES

4) **Does your student have a certain time to do homework?**

YES NO

5) **Does your student have a specific place to do homework?**

YES NO

6) **How often do you think your student should have ALGEBRA homework?**

a) EACH WEEK NIGHT **b) THREE TIMES A WEEK**

c) TWICE A WEEK **d) ONCE A WEEK**

e) NEVER

7) **What would be a reasonable amount of time for your student to spend on ALGEBRA homework each night?**

8) **What things might interfere with your student completing his/her homework? Please list. You may use the back of this sheet to complete your listing.**

HOMEWORK ATTEMPTS AND CHANGES

CONTROL GROUP	FIRST 5 WEEKS OF SCHOOL	ORIGINAL CATEGOR	1ST QUARTER HW RATE	NEW CATEGORY	CHANGE	AFTER 3 WEEKS OF INTERVENTION	NEW CATEGORY	CHANGE	2ND QUARTER HOMEWORK RATES	NEW CATEGORY	CHANGE	3RD QUARTER WITH GCC NOW IMPLEMENTED	NEWEST CATEGORY	CHANGE	TOTAL CHANGE
	10/2/93		11/1/93			11/28/93			1/24/94			3/26/94			SINCE 10/2/93
1	93 8	I	80 o	I	-13 2	81 8	I	1 2	95 7	I	13 9	76 9	II	-18 8	-3 7
2	68 8	II	64 5	II	-4 3	81 8	I	17 3	87	I	5 2	69 2	II	-17 8	4 7
3	93 8	I	64 5	II	-29 3	90 9	I	26 4	78 3	II	-12 6	84 6	I	6 3	20 1
4	56 3	III	38 7	III	-17 6	63 6	II	24 9	52 2	III	-11 4	53 8	III	1 6	15 1
5	81 3	I	71	II	-10 3	90 9	I	19 9	60 9	II	-30	30 8	III	-30 1	-40 2
6	81 3	I	71	II	-10 3	90 9	I	19 9	82 6	I	-8 3	69 2	II	-13 4	-1 8
7	75	II	71	II	-4	45 5	III	-25 5	21 7	III	-23 8	7 7	III	-14	-63 3
8	37 5	III	45 2	III	7 7	54 5	III	9 3	39 1	III	-15 4	7 7	III	-31 4	-37 5
9	100	I	90 3	I	-9 7	100	I	9 7	91 3	I	-8 7	76 9	II	-14 4	-13 4
10	93 8	I	87 1	I	-6 7	90 9	I	3 8	65 2	II	-25 7	46 2	III	-19	-40 9
11	100	I	80 o	I	-19 4	81 8	I	1 2	78 3	II	-3 5	61 5	II	-16 8	-19 1
12	75	II	83 9	I	8 9	63 6	II	-20 3	65 2	II	1 6	53 8	III	-11 4	-30 1
13	62 5	II	41 9	III	-20 o	90 9	I	49	60 9	II	-30	53 8	III	-7 1	11 9
14	87 5	I	61 3	II	-26 2	45 5	III	-15 8	69 o	II	24 1	30 8	III	-38 8	30 5
15	75	II	58 1	III	-16 9	63 o	II	5 5	52 2	III	-11 4	61 4	II	9 2	3 3
16	68 8	II	64 5	II	-4 3	100	I	35 5	87	I	-13	61 5	II	-25 5	-3
17	93 8	I	83 9	I	-9 9	90 9	I	7	91 3	I	0 4	76 9	II	-14 4	-7
18	75	II	48 4	III	-26 o	63 o	II	15 2	56 5	III	-7 1	23 1	III	-33 4	-25 3
19	N/A		N/A		0	N/A		0	N/A		0	30 8	III	30 8	30 8
20	37 5	III	25 8	III	-11 7	36 4	III	10 6	30 4	III	-6	15 4	III	-15	-10 4
AVERAGES	72 835		61 615		-11 22	71 355		9 74	63 27		-8 085	49 6		-13 67	-12 015

EXPERIMENTAL GROUP	FIRST 5 WEEKS OF SCHOOL		1ST QUARTER HW RATE		CHANGE	AFTER 3 WEEKS OF INTERVENTION		CHANGE	2ND QUARTER HOMEWORK RATES		CHANGE	3RD QUARTER WITH GCC NOW IMPLEMENTED		CHANGE	TOTAL CHANGE SINCE 10/2/93
21	50	III	35 5	III	-14 5	18 2	III	-17 3	16 7	III	-1 5	38 5	III	21 8	3
22	56 3	III	32 3	III	-24	0	III	-32 3	0	III	0	0	III	0	-32 3
23	87 5	I	77 4	II	-10 1	90 9	I	13 5	95 8	I	4 9	N/A		-95 8	-77 4
24	68 8	II	48 4	III	-20 4	72 7	II	24 3	54 2	III	-18 5	46 2	III	-8	-2 2
25	62 5	II	41 9	III	-20 6	18 2	III	-23 7	16 7	III	-1 5	53 8	III	37 1	11 9
26	68 8	II	61 3	II	-7 5	72 7	II	11 4	79 2	II	6 5	15 4	III	-63 8	-45 9
27	62 5	II	41 9	III	-20 6	18 2	III	-23 7	25	III	6 8	23 1	III	-1 9	-18 8
28	50	III	38 7	III	-11 3	18 2	III	-20 5	16 7	III	-1 5	15 4	III	-1 3	-23 3
29	100	I	80 6	I	-19 4	81 8	I	1 2	79 2	II	-2 6	84 6	I	5 4	4
30	81 3	I	51 6	III	-29 7	45 5	III	-6 1	50	III	4 5	53 8	III	3 8	2 2
31	81 3	I	51 6	III	-29 7	36 4	III	-15 2	33 3	III	-3 1	61 5	II	28 2	9 9
32	100	I	80 6	I	-19 4	45 5	III	-35 1	58 3	III	12 8	38 5	III	-19 8	-42 1
33	75	II	54 8	III	-20 2	72 7	II	17 9	79 2	II	6 5	84 6	I	5 4	29 8
34	31 3	III	22 6	III	-8 7	36 4	III	13 8	33 3	III	-3 1	7 7	III	-25 6	-14 9
35	37 5	III	29	III	-8 5	36 4	III	7 4	33 3	III	-3 1	30 8	III	-2 5	1 8
36	87 5	I	54 8	III	-32 7	81 8	I	27	79 2	II	-2 6	76 9	II	-2 3	22 1
37	81 3	I	58 1	III	-23 2	54 5	III	-3 6	54 2	III	-0 3	30 8	III	-23 4	-27 3
38	87 5	I	51 6	III	-35 9	63 6	II	12	58 3	III	-5 3	46 2	III	-12 1	-5 4
39	68 8	II	58 1	III	-10 7	90 9	I	32 8	83 3	I	-7 6	15 4	III	-67 9	-42 7
40	81 3	I	48 4	III	-32 9	63 6	II	15 2	45 8	III	-17 8	23 1	III	-22 7	-25 3
41	81 3	I	64 5	II	-16 8	63 6	II	-0 9	70 8	II	7 2	76 9	II	6 1	12 4
42	75	II	58 1	III	-16 9	63 o	II	5 5	66 7	II	3 1	38 5	III	-28 2	-19 6
43	62 5	II	74 2	II	11 7	63 6	II	-10 6	66 7	II	3 1	84 6	I	17 9	10 4
44	0	III	N/A		0	N/A		0	N/A		0	61 5	II	61 5	61 5
45	N/A		N/A		0	N/A		0	16 7	II	16 7	0	III	-16 7	0
AVERAGES	65 52		48 64		-16 88	48 36		-0 28	48 504		0 144	40 312		-8 192	-8 328

BEST COPY AVAILABLE

HOMEWORK ATTEMPTS AND CHANGES - FIRST HOUR CONTROL GROUP
(HABITUAL TRUANTS AND THOSE NOT PARTICIPATING DURING ALL THREE QUARTERS HAVE BEEN REMOVED)

CONTROL GROUP STUDENT #	BASELINE (5 WEEKS) 10/2/93	ORIGINAL CATEGORY	1ST QUARTER HW RATE 11/1/93	NEW CATEGORY	CHANGE SINCE 10/2/93	AFTER THREE WEEKS OF INTERVENTION 11/28/93	NEW CATEGORY	CHANGE SINCE 11/1/93	2ND QUARTER HW RATES 1/24/94	NEW CATEGORY	CHANGE SINCE 11/28/93	NET CHANGE SINCE 11/1/93	3RD QUARTER BOTH GROUPS USING GCC 3/26/94	NEWEST CATEGORY	CHANGE SINCE 1/24/94	TOTAL CHANGE SINCE 11/1/93
1	93.8	I	80.6	I	-13.2	81.8	I	1.2	95.7	I	13.9	15.1	76.9	II	-18.8	-3.7
2	68.8	II	64.5	II	-4.3	81.8	I	17.3	87	I	5.2	22.5	69.2	II	-17.8	4.7
3	93.8	I	64.5	II	-29.3	90.9	I	26.4	78.3	II	-12.6	13.8	84.6	I	6.3	20.1
4	56.3	III	38.7	III	-17.6	63.6	II	24.9	52.2	III	-11.4	13.5	53.8	III	1.6	15.1
5	81.3	I	71	II	-10.3	90.9	I	19.9	60.9	II	-30	-10.1	30.8	III	-30.1	-40.2
6	81.3	I	71	II	-10.3	90.9	I	19.9	82.6	I	-8.3	11.6	69.2	II	-13.4	-1.8
7	75	II	71	II	-4	45.5	III	-25.5	21.7	III	-23.8	-49.3	??	III	-14	-63.3
8	37.5	III	45.2	III	??	54.5	III	9.3	39.1	III	-15.4	-6.1	??	III	-31.4	-37.5
9	100	I	90.3	I	-9.7	100	I	9.7	91.3	I	-8.7	1	76.9	II	-14.4	-13.4
10	93.8	I	87.1	I	-6.7	90.9	I	3.8	65.2	II	-25.7	-21.9	46.2	III	-19	-40.9
11	100	I	80.6	I	-19.4	81.8	I	1.2	78.3	II	-3.5	-2.3	61.5	II	-16.8	-19.1
12	75	II	83.9	I	8.9	63.6	II	-20.3	65.2	II	1.6	-18.7	53.8	III	-11.4	-30.1
13	62.5	II	41.9	III	-20.6	90.9	I	49	60.9	II	-30	19	53.8	III	-7.1	11.9
14	87.5	I	61.3	II	-26.2	45.5	III	-15.8	69.6	II	24.1	8.3	30.8	III	-38.8	-30.5
15	75	II	58.1	III	-16.9	63.6	II	5.5	52.2	III	-11.4	-5.9	61.4	II	9.2	3.3
16	68.8	II	64.5	II	-4.3	100	I	35.5	87	I	-13	22.5	61.5	II	-25.5	-3
17	93.8	I	83.9	I	-9.9	90.9	I	7	91.3	I	0.4	7.4	76.9	II	-14.4	-7
18	75	II	48.4	III	-26.6	63.6	II	15.2	56.5	III	-7.1	8.1	23.1	III	-33.4	-25.3
19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	37.5	III	25.8	III	-11.7	36.4	III	10.6	30.4	III	-6	4.6	15.4	III	-15	-10.4
CLASS AVERAGE	76.66R		64.858		-11.811	75.111		10.253	66.6		-8.511	1.742	50.589		-16.011	-14.268
STD	18.1250351		17.66478256		10.130927	19.29807468		17.777643	20.65559692		13.61624	17.322979	23.82780098		12.415775	21.575133
CATEGORY TALLIES		I = 9 II = 7 III = 3		I = 6 II = 7 III = 6			I = 11 II = 4 III = 4			I = 6 II = 7 III = 6				I = 1 II = 8 III = 10		
% INCREASE OR DECREASE					-15.41%			15.81%			-11.33%	2.69%			-24.04%	-22.00%

2ND QUARTER EFFECT SIZE = $\frac{\bar{X}c - \bar{X}c}{STDc}$ = -0.601773943

3RD QUARTER EFFECT SIZE = -0.169717718

CATEGORY KEY

BASED ON PERCENTAGE OF HOMEWORK ATTEMPTED

CATEGORY I = 80-100
CATEGORY II = 60-79
CATEGORY III = Below 60 %

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HOMEWORK ATTEMPTS AND CHANGES - SECOND HOUR EXPERIMENTAL GROUP
(HABITUAL TRUANTS AND THOSE NOT PARTICIPATING DURING
ALL THREE QUARTERS HAVE BEEN REMOVED)

EXPERIMENTAL GROUP STUDENT #	BASELINE (5 WEEKS) 10/2/93	ORIGINAL CATEGORY	1ST QUARTER HW RATE 11/1/93	NEW CATEGORY	CHANGE SINCE 10/2/93	AFTER THREE WEEKS OF INTERVENTION 11/28/93	NEW CATEGORY	CHANGE SINCE 11/1/93	2ND QUARTER HW RATE 1/24/94	NEW CATEGORY	CHANGE SINCE 11/28/93	NET CHANGE SINCE 11/1/93	3RD QUARTER BOTH GROUPS USING GCC 3/26/94	NEWEST CATEGORY	CHANGE SINCE 1/24/94	TOTAL CHANGE SINCE 11/1/93
21	50	III	35 5	III	-14 5	18 2	III	-17 3	1o 7	III	-1 5	-18 8	38 5	III	21 8	3
22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24	68 8	II	48 4	III	-20 4	72 7	II	24 3	54 2	III	-18 5	5 8	46 2	III	-8	-2 2
25	62 5	II	41 9	III	-20 6	18 2	III	-23 7	1o 7	III	-1 5	-25 2	53 8	III	37 1	11 9
2o	68 8	II	61 3	II	-7 5	72 7	II	11 4	79 2	II	6 5	17 9	15 4	III	-63 8	-45 9
27	62 5	II	41 9	III	-20 6	18 2	III	-23 7	25	III	6 8	-16 9	23 1	III	-1 9	-18 8
28	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
29	100	I	80 o	I	-19 4	81 8	I	1 2	79 2	II	-2 o	-1 4	84 6	I	5 4	4
30	81 3	I	51 o	III	-29 7	45 5	III	-o 1	50	III	4 5	-1 o	53 8	III	3 8	2 2
31	81 3	I	51 o	III	-29 7	3o 4	III	-15 2	33 3	III	-3 1	-18 3	61 5	II	28 2	9 9
32	100	I	80 o	I	-19 4	45 5	III	-35 1	58 3	III	12 8	-22 3	38 5	III	-19 8	-42 1
33	75	II	54 8	III	-20 2	72 7	II	17 9	79 2	II	6 5	24 4	84 6	I	5 4	29 8
34	31 3	III	22 6	III	-8 7	36 4	III	13 8	33 3	III	-3 1	10 7	7 7	III	-25 6	-14 9
35	37 5	III	29	III	-8 5	3o 4	III	7 4	33 3	III	-3 1	4 3	30 8	III	-2 5	1 8
3o	87 5	I	54 8	III	-32 7	81 8	I	27	79 2	II	-2 o	24 4	76 9	II	-2 3	22 1
37	81 3	I	58 1	III	-23 2	54 5	III	-3 6	54 2	III	-0 3	-3 9	30 8	III	-23 4	-27 3
38	87 5	I	51 o	III	-35 9	63 6	II	12	58 3	III	-5 3	6 7	46 2	III	-12 1	-5 4
39	68 8	II	58 1	III	-10 7	90 9	I	32 8	83 3	I	-7 6	25 2	15 4	III	-67 9	-42 7
40	81 3	I	48 4	III	-32 9	63 6	II	15 2	45 8	III	-17 8	-2 6	23 1	III	-22 7	-25 3
41	81 3	I	64 5	II	-16 8	63 6	II	-0 9	70 8	II	7 2	6 3	76 9	II	6 1	12 4
42	75	II	58 1	III	-16 9	63 6	II	5 5	66 7	II	3 1	8 6	38 5	III	-28 2	-19 6
43	62 5	II	74 2	II	11 7	63 6	II	-10 6	66 7	II	3 1	-7 5	84 6	I	17 9	10 4
44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CLASS AVERAGE	72 21		53 38		-18 83	54 995		1 615	54 17		-0 825	0 79	46 545		-7 625	-6 835
STD	17 5075384		14 759322 48		10 749098	21 582 75874			21 251 16703		7 6294086	15 244438	24 243 38002		26 197669	21 281712
CATEGORY TALLIES		I = 9 II = 8 III = 3		I = 2 II = 3 III = 15			I = 3 II = 8 III = 9			I = 1 II = 7 III = 12				I = 3 II = 3 III = 14		
% INCREASE OR DECREASE					-26 08%			3 03%			-1 50%	1 48%			-14 08%	-12.80%
GAP BETWEEN GROUPS	4 458		11 478			20 116			12 43				4 044			

GAP CHANGE: AT END OF SECOND QUARTER	7 972	**AT END OF THIRD QUARTER**	-0 414
PERCENT CHANGE IN GAP AT END OF SECOND QUARTER	178 82%	**PERCENT CHANGE IN GAP AT END OF THIRD QUARTER**	-9 29%

CATEGORY KEY

BASED ON PERCENTAGE OF HOMEWORK ATTEMPTED

CATEGORY I = 80-100
CATEGORY II = 60-79
CATEGORY III = BELOW 60%

BEST COPY AVAILABLE

Appendix I

HOMEWORK JOURNAL

DATE	ASSIGNMENT	COMPUTATION	JOURNAL ENTRIES
	#: pg: ( )	C = N = % =	
	#: pg: ( )	C = N = % =	
	#: pg: ( )	C = N = % =	
	#: pg: ( )	C = N = % =	